SIERRA CLUB BULLETIN.

VOL. II. SAN FRANCISCO, JANUARY, 1898. NO. 3.

THE EXPEDITION OF HIS HIGHNESS, PRINCE LUIGI AMEDEO OF SAVOY, DUKE OF ABRUZZI, TO MT. ST. ELIAS IN SOUTHERN ALASKA.

[It is with much pleasure that the BULLETIN presents to its readers the only full account yet published in America of the expedition of the Prince of Savoy to Mt. St. Elias. It has been prepared from a lecture by Dr. Filippo de Fillippi, delivered in Turin before the Italian Alpine Club, and first printed in the *Rivista Mensile del Club Alpino Italiano*, for November, 1897. The translation is by Dr. Paolo de Vecchi, a member both of the Torino Italian Alpine Club and the Sierra Club.— *Editor.*]

In the beginning of February, 1897, Prince Louis of Savoy decided to make an expedition to Alaska and attempt the ascent of Mt. St. Elias. He selected as companions, Umberto Cagni, member of the section of the Torino Italian Alpine Club, Francesco Gonella, President of the same section, Vittorio Sella, member of the section of Biella of the Italian Alpine Club, and Dr. Filippo de Fillippi of the section of Torino. To complete the party there were four guides: Joseph Petigax and Lorenzo Croux, Antonio Maquignaz and Andrea Pellissier; and, also, Erminio Botta, the special guide of Mr. Sella, whom he had accompanied on his trip to the Caucasus.

As soon as the company was completed, the work of preparing the material for the expedition was begun. Dr. Paolo de Vecchi, a member of the section of Torino of the

Italian Alpine Club, who lives in San Francisco, California, and who is also a member of the Sierra Club, took charge of the preparation of food and arms.* Professor Fay, of Boston, ex-President of the Appalachian Mountain Club, took charge of the means for transportation. Professor George Davidson, of San Francisco, and Israel C. Russell, of Michigan, gave much valuable advice and bibliographical information, so that gradually the materials for a successful expedition were prepared, and the trip rendered more rapid and easy. The equipment of the expedition was made in great part in Italy and London, only the food and arms being bought in San Francisco.

The party left Torino, May 17, 1897, and, after spending three days in London buying materials, left Liverpool on the 22d of May, on the "Lucania" of the "Cunard Line," had a splendid trip, and arrived in New York the night of May 28th; and the following morning proceeded, via the Pennsylvania Railroad, to San Francisco, arriving there the 3d of June, at night. The six days in San Francisco were busily spent selecting the food and properly preparing it for such a trip; and on the evening of the 9th the expedition left San Francisco by rail, for Seattle, where it arrived the 11th, in time to catch the "City of Topeka," which sailed the 13th for Sitka, the capital of Alaska. A few days before, the schooner "Aggie," specially chartered, had left Seattle to wait for the expedition at Sitka, bringing with her ten American packers of Seattle, under the orders of Major E. S. Ingraham, who had selected them specially for the purpose.

Alaska, which is so well known at this moment from the discovery of rich deposits of gold, has no need of very much description. It is separated from the English territory by the 141st meridian of longitude W. (Greenwich), to a point

*Note.—In this connection Dr. de Vecchi gratefully acknowledges the kindness of Captain Gustave Niebaum, Mr. Leon Sloss, and others of the Alaska Commercial Company.

thirty miles from the Pacific. From this point the boundary line follows the summit of the mountains lying parallel with the coast, in an irregular line, as far as latitude 56 north, at the head of the Portland Canal, and thence down the canal to Prince of Wales Island. It is a long strip of land extending along British Columbia for 500 miles. In its southern part this portion of the coast is an intricate archipelago, a continuation of which extends along the coast of Columbia to the island of Vancouver.

Sitka, the capital of Alaska, lies in this extreme southern point of the territory, among a few settlements of white people, with a great number of Indians. The condition of the country is almost the same as it was thirty years ago, when it passed from the Russian government to the United States. This government has continued, by more progressive methods, to utilize the productions of the country, which are principally furs, fish, and minerals. The Indians of the coast are at present under a very liberal government, but apparently are only in part civilized. They could very much improve their condition if it were not for the unfortunate tendency of the race which renders their civilization difficult.

The trip from Seattle to Sitka occupies six days, and the boat runs through the strait between the island of Vancouver and the coast of British Columbia, along a tortuous canal of the Alexander Archipelago, which is very picturesque and rich in almost virgin forests and in glaciers which come to the sea.

It is impossible to give in this short article an adequate description of these fantastic surroundings, of the strange luminous night in which the sun-setting is confused with the sun-rising, of the sea full of icebergs, which float quietly around the boat, and of the coast capriciously cut up by canals and small bays, and covered everywhere with a thick vegetation of conifers. The trip is a continual suc-

cession of beautiful tableaux of admirable color, and keeps the passenger on the bridge of the boat fascinated by such new and striking views of savage nature.

The most populous city of Alaska is Juneau, the only city formed there since its occupation by the United States. It is situated at the end of a small bay, near a well-known mine—the Treadwell—and is at present the starting point for the miner who goes to the rich placers of the interior. Unless disappointed in the strong immigration now going in that direction, this city will grow very rapidly. When the expedition passed, in June, 1897, the place was very quiet and the few inhabitants seemed to be unoccupied. Besides the few white people, there were a good many Indians loafing around,—dirty, with faces colored and hair hanging over their shoulders. Only two months afterward, the expedition returning found the city very lively, full of an excited crowd in a ferment from the discovery of the Klondike.

From Juneau the boat goes up to Glacier Bay, and, over the blue sea, full of large blocks of ice which appear to be marble tombs of a large cemetery, emerge two great ice docks. To the left appears the imposing peak of Mt. Fairweather, and to the right, at the end of the bay, the Muir Glacier, from the walls of which fall, at intervals, masses of ice, which plunge into the sea with a deafening sound. From accurate measurements made by G. F. Wright, the center of this glacier moves with a speed of twenty yards a day.

The 20th of June, the expedition landed at Sitka, situate on the island of Baranoff, with a natural bay covered with islands and rocks and opening on the ocean. Sitka is the limit where the regular navigation stops, and there the archipelago which surrounds the coast stops also, between the fifty-eighth and fifty-ninth parallels. From this point there extends to the northwest a bare coast, and in a length of 300 miles there is only one bay of importance,—Yakutat.

All the rest of the coast is exposed to the stormy sea, and is very dangerous to approach. This part of the Pacific is navigated once a month by the steamers of the Alaska Commercial Company as far as Cook's Inlet, where commences the great peninsula of Alaska to which is attached the chain of the Aleutian Islands separating Behring Sea from the Pacific Ocean. On one of these steamers, the "Bertha," the expedition left, the night of the 20th of June, with the "Aggie" in tow, having our guides and the ten American packers under Major Ingraham. The trip was far from good, and the weather did not allow the sight of the mountains to be enjoyed.

To the north of Sitka, and beyond the opening of Cross Sound, the coast is straight, without any bay, bordered by bastion-like rocks hanging over the sea, behind which are the imposing tops of Mt. Crillon, Mt. Fairweather, and Mt. La Perouse. Then are seen the great Pacific glaciers, plunging into the ocean, and after some fifty miles begins to appear the top of Mt. St. Elias, which seems to emerge gradually from that sea of ice. One understands how every navigator has been impressed by such a sight, and especially why St. Elias has attracted the attention of so many daring mountain climbers.

Around, isolated from St. Elias, toward the east, appear also, in their magnitude, the tops of Mt. Augusta, Mt. Logan, Mt. Cook, and Mt. Vancouver.

At 10:30 of the night of the 22d of June, the "Bertha" with the schooner "Aggie," reached port Mulgrave on Yakutat Bay, opposite the Indian village, and was received by the cheering natives gathered at the landing, and the terrible barking of the innumerable dogs. The village has perhaps twenty wooden houses, which are all small cabins.

There are here four or five white people, among them Rev. Hendriksen, a Swedish missionary, who is much inter-

ested in meteorology, and who took charge of the two barometers left there by the expedition.

A few hours after the morning of the 23d, the "Bertha" left Port Mulgrave with the "Aggie" in tow, and crossing the bay, landed on the coast of the Malaspina Glacier. This glacier has its head at the apparent foot of the mountains above named, has an average elevation of 300 yards above the sea, and is about fifty miles long by thirty in width, with an approximate surface of 1776 square miles. The front line of the glacier extends along the coast for ninety-four miles, and is separated from it only by a narrow strip of forest, which appears here and there covering it with quite a rich vegetation. The coast is bare, save only at a few points, and at one of these points the ice extends to the sea. From this immense extent of glacier run many rivers and creeks, which bring to the sea a large quantity of debris.

Four expeditions had before attempted the ascent of Mt. St. Elias. The first, in 1886, sent by the *New York Times*, included Professor Libby, F. Schwatka, and H. W. Seton-Karr. The second, in 1888, included E. H. and Harold W. Topham, G. Broke and William Williams. Both landed on the Pacific coast, opposite Chaix Hills, the landing being on the Malaspina, to the southward of St. Elias, and they tried to reach the top from the west and the south. The first expedition reached only 7511 feet. The second reached 8154 feet, but both had to abandon the attempt, as the slope selected was too steep, and also on account of the lack of good packers and sufficient provisions.

The other two expeditions, both directed by Professor Israel C. Russell, were organized by the National Geographic Society and by the U. S. Geological Survey, in 1890 and 1891. The first year, Russell landed at the end of Yakutat Bay, at the foot of the ridge which comes from the eastern part of the Cook chain, and keeping along the base of it on

the boundary between Malaspina Glacier and the glaciers tributary to the chain, he reached the Hitchcock Hills, and through the depression of the Pinnacle Pass, the Seward Glacier, and then, crossing the Dôme Pass of the Samovar chain, he reached the Agassiz Glacier. From there he had before him the natural road of the large basin of the Newton Glacier to the top, but bad weather, due especially to the season being late, compelled him to return when he was almost at the foot of the mountain.

The next year he made the attempt again, landing on the Pacific coast where Schwatka and Topham had landed. The heavy seas were the cause of a wreck which cost the lives of six persons. Crossing the Malaspina, he climbed the glaciers of Agassiz and Newton, to the base of the Pyramid, and the morning of the 24th of July, 1891, he left the last camp, with two companions, to attempt the ascent. With great fatigue, cutting the steps on the steep wall of snow which closed the end of the Newton Basin, he arrived at noon on the hill between Mt. St. Elias and Mt. Newton, 12,284 feet above the sea, and began to ascend the ridge of snow which extended directly from the hill to the top. At 14,432 feet of altitude, he had to renounce the attempt on account of the late hour and the threatening weather. Wet to the bone for many days, badly protected from the snow in poorly-made tents, exhausted physically by the continual work, and impressed by the gigantic avalanches falling from such a steep wall to the valley, he decided to wait for good weather, and finally abandoned the attempt; so returning to the coast where he had landed, he followed the edge of the Malaspina Glacier, exploring the immense coast to the end of the bay of Yakutat.

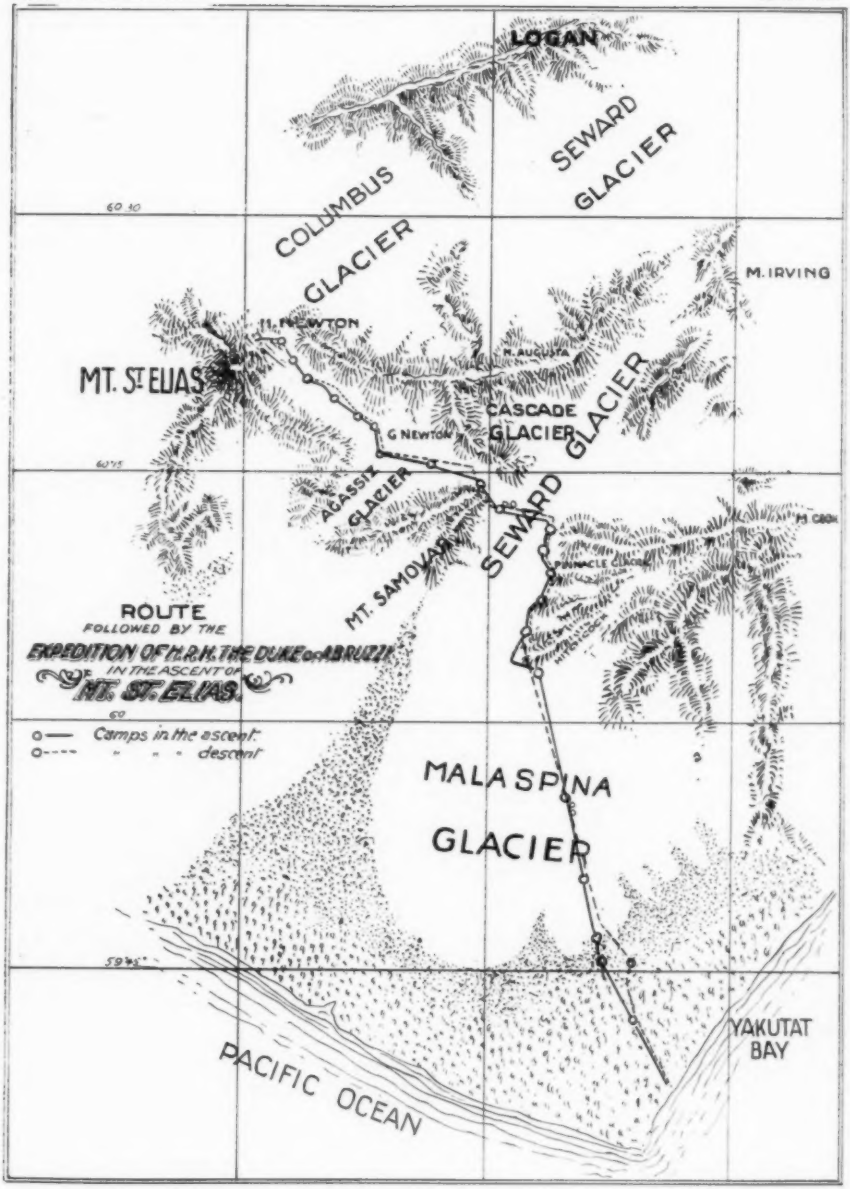
These two explorations convinced the scientists that Mt. St. Elias was not a volcano, but a mountain formed of crystal rocks. Accurate triangulation and hypsometric determination of the principal peak resulted in forming a very good

map, which was quite useful to the Prince, and will be so to any future expedition.

Having explored all the coast of the Malaspina, Russell could indicate the best point for landing, and it was by his advice that his Highness landed on the west coast of the bay, a few miles north of Cape Manby, near the mouth of the Osar River. From this point the itinerary already planned was followed punctually. First crossing the forest and the large frontal moraine, a distance of eight miles, then traversing the Malaspina obliquely, and reaching the foot of the Hitchcock Hills, twenty-three miles farther, the expedition went up to the Seward Glacier, along the west side of the hills, until it reached the ridge which borders the north part of the Pinnacle Glacier, ten miles from the Hitchcock Hills. From this place, crossing the Seward and Dôme Pass, which is a depression of the chain of the Samovar Hills, they reached the eastern edge of the Agassiz Glacier, climbing the long valley of the Newton Glacier, a distance of twenty-two and one-half miles. This is dominated by a snowy hill, from which a ridge of ice with moderate inclination reaches St. Elias, and it is over this ridge that the expedition reached the top, returning on the same road.

One hour after leaving the little Indian village on the morning of the 23d of June, a thick fog compelled the "Bertha" to stop in the middle of the bay, where the expedition had to wait impatiently until after two o'clock P. M., when the atmosphere began to clear up and the coast appeared with its line of trees.

Far away could now be seen the base of the Cook chain, with its icy block-tributary of the Malaspina filling up the valleys. The expedition approached very prudently to explore the coast, and at five was at the mouth of the Osar River. Umberto Cagni, who was exploring the coast,


LOGAN
SEWARD GLACIER
COLUMBUS GLACIER
M. IRVING
MT. St ELIAS
M. NEWTON
N. AUGUSTA
CASCADE GLACIER
G NEWTON
AGASSIZ GLACIER
SEWARD GLACIER
MT. SAMOVAR
PINNACLE GLACIER
ROUTE
FOLLOWED BY THE
EXPEDITION OF H.R.H. THE DUKE of ABRUZZI
IN THE ASCENT OF
MT. ST. ELIAS.
Camps in the ascent.
" " descent
MALASPINA GLACIER
YAKUTAT BAY
PACIFIC OCEAN

found the landing possible, and the unloading of the steamer began at once. At eight o'clock the Prince left the schooner, and in a few hours, upon a sandy elevation on the border of the Osar River, the first camp was established, and at night the expedition tried to take rest, notwithstanding the furious attack of the numerous and ferocious mosquitoes. The schooner left the same night for Port Mulgrave to wait for the return.

Fifteen days before, another expedition under the direction of Professor Bryant of Philadelphia had landed at the same point.

About three miles of forest separated the camp from the ridge, and on the morning of the 24th, the Prince, heading a small party, went ahead to find a practical road. The other members, left to the care of the tent, put away safely the reserve materials which were to be left on the coast, and began to form the different packs, which had to be carried by the packers to the foot of the ridge, across the confluence of the Osar River, over a bridge naturally formed by the trunk of a tree. The road ran along the right side of the river, now in the sand or in the gravel of the large bed of the river, now at the edge of the forest, under large trees or in thick bushes, or through the rich vegetation of the ferns which grow under the pines, over a level plain made soft by the ferns and mosses with which the trunks of these conifers are covered. Hawks, crows, magpies, geese, seagulls, and many small birds made the place very lively with their cries.

There were some footprints of bear, but the expedition had no time to lose. The second camp was established at 150 feet above sea-level, on the edge of the ridge, which is bare and full of mud and stones, with some blocks of granite. Crossed by small creeks and ponds, the bottoms of which are of very fine sand, this ridge is about four miles long, and ends abruptly at 492 feet above the sea-level,

with a very neat edge cut towards the glacier, yet covered with a thick layer of snow.

For six days the work was directed with great ability by the Prince, and on the night of June 29th all of the provisions were brought to the edge of the glacier, with the help of four Indians who afterwards left for Yakutat, carrying the last letters.

The sleds are ready, but a trying trip is anticipated on account of the soft snow. Upon the sleds is packed food for sixteen days; three large Whymper tents; two small Mummery tents for high mountains, with waterproof which keeps the bottom dry; a black tent for the photographic work; a sack-bed blanket of feathers, which they use on a very light iron folding bed, extending eight inches from the ground; two aluminum coal oil stoves, such as were used by Nansen, and two alcohol stoves, which can be quickly lighted during the march. Every member has a sack which contains a complete suit of clothes. Vittorio Sella has two large photographic machines. The expedition carries two mercurial barometers, two large aneroids, psychometer, hygrometer, compass, inclinometer, alcohol and mercurial thermometers, hypsometer, field glasses, sanitary provisions, smoked spectacles, manilla ropes, wooden litters, such as were used by Sella on his trip to the Caucasus, which are to be used where it is impossible to use the sleds.

The food is divided into daily rations. A tin box and a sack, weighing together forty-six pounds, contain all that is necessary for ten persons in one day—crackers, canned meat, paste for soup, Liebig's extract, butter and lard, condensed milk, sugar, tea, coffee, half a pint of rum, chocolate, dried and canned fruit, cheese, salt, pepper, soap, matches, three candles, coal oil and alcohol. The American packers were provided in about the same way by Major Ingraham. Altogether the expedition carries on the four sleds a weight of 635 pounds.

The expedition leaves the ridge on the first day of July at 3 A.M. The temperature is two degrees centigrade, and the atmosphere clear. The immense white glacier of Malaspina extends as far as the sight. To the right, from the Cook chain, come different slopes, forming between them valleys full of ice; and in front, about twenty-five miles distant, stands Mt. Augusta at the entrance of the Seward Glacier, which falls in a cascade over the Malaspina, through a bed made by the Hitchcock and Samovar Hills on either side. Behind all these stands, like a gigantic pyramid, Mt. St. Elias.

The expedition leaves the rocks with emotion, for there is before it the unknown expanse of snow and ice, an icy ocean to which there is no limit. What will become of the goods left behind if the rain and the snow should fall incessantly? But there is no time to think of emotions, and there is the little camp of green tents to rest the eye from this immense solitude. The tents are generally set in picturesque disorder, being arranged only so as to turn the openings away from the wind. If the snow was soft, it was soon made hard by the feet, and in a few minutes after stopping and unloading the sleds, the camp was formed, the coal oil stove set to burn, and soon the soup was boiling. During the cold and rainy days the cooking was done under a tent, and after the meals a siesta and a little conversation were the only distractions.

It takes three days to cross the Malaspina Glacier. The sleds being very heavily loaded and the snow soft, it requires the strength of all the expedition to proceed. A thick layer of snow covers everything, so that it is impossible to see the crevasses. The surface is undulated in long ditches, with an inclination, gentle, but perceptible enough to the men pulling a sled, and besides, the bottoms of many pond-depressions where the snow was melted is an impediment to progress. Many narrow creeks run over

the ice between the two borders of the valley, and they are crossed with bridges made with the picks. The panorama is monotonous but grand. After the first brilliant, sunny day, follows fog and a little rain, and then his Highness, at the head of the expedition and connecting the others with the ropes, has the unpleasant task of directing with the compass the progress of the party, which is rendered perfectly desolate by the persistent fog.

On July 3d, at 3:30 P. M., after ten hours of marching in a dense fog, the members of the expedition, fatigued and wet, arrived at the Hitchcock Hills, and were pleasantly received by a flock of white mountain quail, which rose from the few bushes covering the steep hill.

The party is now at the foot of the Seward, and pitches its tents on the snow at 1676 feet above the sea level. It is the seventh camp since the departure. The next day, the 4th of July, the Prince takes a rest, in honor of Independence Day and of the American packers who are rejoicing on their national anniversary. They were a curious group, those packers, and very difficult to describe. Five were students of the universities in science, in letters, and in philosophy. Four were mariners and among these a professor of Latin and Greek, and our poet. They all worked well and with enthusiasm, following diligently the direction of Major Ingraham, who did more than could be expected for the good success of the enterprise. Independence Day was employed by the guides in studying the ascent of the Seward.

Crossing the left ridge, among the ice and rocks, the party reaches the front where the cascade of the Seward runs into the Malaspina. Between the masses of ice and the extreme peak of the Hitchcock Hills there is a steep fall, full of snow, about 328 feet high. This bastion the guides begin to attack with their picks, and before noon of the 5th, through a trail made in zigzag form, the expedition has

reached the top of the Seward, facing a large amphitheater crowned by the tops of Augusta, of Matasona, and of St. Elias.

If the Malaspina is a great calm lake, the Seward is a stormy sea, about seven miles wide and a chaos of disorderly piled-up masses. To the steep walls of Augusta and Matasona are attached masses of ice-like snow, and far behind is plainly visible St. Elias, with its northern ridge, over which the climb must be made. The undertaking does not look difficult. The proportion of the surrounding panorama is so great that the top of the mountain looks small, and one cannot yet realize how high it is. Capricious spots of fog hang over the different peaks, moving and giving to the sky the different colors of the rainbow and producing a magnificent effect. The condition of the glacier compels the expedition to attack its left flank, sometimes dragging the sleds over the plain formed by the snow, sometimes carrying them on the shoulder and across the sudden undulations of the ice. The party is reduced by five American packers, who go back to bring the food from the last camp on the Malaspina.

The 8th of July, passing over the snowy creeks and a few spots covered with herbs, with some violets and anemones, the expedition climbs a glacier which, coming from the Pinnacle Pass, extends to the Seward, surrounding a spur of the Hitchcock foothills. This large surface is crossed with the sleds, and the 9th of July a camp is set at 3178 feet above sea level, on a small hill at the north foot of the Pinnacle. It is the twelfth camp, and it has taken sixteen days to reach this low altitude.

The expedition is now thirty-five miles from the coast. Near this camp on the rocks at the top of the hill there is found a fragment of tent and some stones piled up as a signal. They are the only traces of human beings found on the trip, left in 1890 by the first expedition of Russell while descending the Pinnacle Pass. The expedition

gathers many conglomerate rocks and some fossil shells among the round pebbles and the sand on the top. At this point the American packers leave the party, and under the direction of Major Ingraham, form a chain to bring food from the Malaspina to a point half way up the Newton Glacier. The Prince personally supervised this important service, and the provisions were punctually carried to the place.

The Seward Glacier is so split that the expedition crosses only with difficulty, the 10th of July, after a reconnoitering movement made by the Prince himself. The sky is overcast, the temperature mild, and the snow soft, and it is difficult to proceed over dice-like blocks of snow. Fortunately, they are hard enough to support the weight. There are no blocks of true ice, but of snow of different thicknesses, and at the base of Mt. Owen and Mt. Augusta there is a layer of *Arenaria* belonging to the Samovar, above which is an immense valley covered with ice, reaching the Dôme Pass at an elevation of 3936 feet above the sea-level, and behind appear the beautiful peaks of Mt. Owen and Mt. Irving.

The top of the pass is reached on the 12th of July, in the fog and a little mist, and the next day camp pitched on the edge of the Agassiz Glacier, at 3480 feet above the sea level. It is the fifteenth camp and the foot of the true mountain. At this point the expedition leaves the last sled and everything which is not absolutely necessary.

The Newton Glacier, seven miles long and from two-thirds of a mile to one and seven-eighths miles in width, has three sides, and the wall of the valley, full of snow, is surrounded by magnificent peaks of ice hanging over and covered by fresh snow. It takes thirteen days to reach the top, forming six camps and stopping every mile and a quarter, fighting the snow, which is falling almost continually, blinded by very thick fog, and walking with great

fatigue over the snow in which the members sometimes plunge to the hips. The scene is terrifying among those blocks of ice, over bridges of snow not always steady and with the continual noise of the avalanches of snow, mixed with stones, which are falling day and night. Of thirteen days, only three were tolerably clear, and during these the panorama was really enchanting, with its different colors changing at every instant, and with a characteristic indigo-blue, very different from the coloring of the Italian Alps. These glaciers differ from those of the Alps in that the stormy weather in Alaska is not dangerous, and the thunder is not heard mingled with the noises of the avalanches. It is impossible to realize the difficulties of this last trip among the immense crevasses covered by snow, where the passage is dangerous, and where the members sometimes plunge to the shoulders; and here the guides show their ability in digging and pounding the snow, with great fatigue, to make a trail.

Half way up the glacier the expedition leaves one tent and all the iron folding beds, and there, for the first time, hears through the packers, of the party of Bryant, whom they had met on the other side of the Newton, he having renounced the further ascent on account of the sickness of one of his men.

On the evening of the 28th of July, with the sky in part clear, the expedition leaves the last camp on the Newton, the twenty-first one, at 8958 feet altitude. In front stands the pyramid of St. Elias. The 29th of July, three guides advance to cut steps on the wall of the hill, and the Prince goes back to bring some food from the last camp. The evening is very clear and every one of the expedition is enthusiastic and ready for the approaching last attempt. They leave at four o'clock on the morning of the 30th, with two tents, the bed blankets, two and one-half days rations, one coal oil and one alcohol stove, all the instruments

and the two photographic machines. The snow is a little harder. The morning is very clear, and the expedition crosses as rapidly as possible the space almost brushed over by the previous avalanches, and in an hour and a half reaches the foot of the wall and there begins the ascent of that steep bastion. At first Sella slips down, and then a guide loses his coat and fifteen minutes are lost in recovering it; and after climbing over the shoulder of the guide in many instances, they reach the top of the ridge and camp at 12,284 feet above the sea level. This hill stands on the south of the large ridge of St. Elias, and at the north of the snowy ridge of Newton. At its foot lies the great ice valley of Newton. The atmosphere is so clear that the far-away sea and all the peaks around — Irving, Vancouver, Augusta, and Cook — can be seen. From St. Elias, and from the rocks of Newton, continual avalanches of snow and ice and stone fall with tremendous noise. The sun-setting is beautiful. The sky is steel-blue, the rest of the horizon orange-red, and Augusta looks like a volcano in eruption. The temperature, eight degrees below zero centigrade, and a cold breeze compel the members to retire under the tent. The nights are a little longer, but longer still are the exciting thoughts of the next day's undertaking. They are all up at midnight, and after a good, boiling cup of coffee, they form the last pack,—a few rations for one day, the mercurial barometer, two aneroids, the igrometer, the alcohol and mercurial thermometers, and the two photographic machines.

The night is very calm, very clear, and Venus brilliant over the top of Newton. The members are divided into three divisions. His Highness, Cagni, the two guides Petigax and Maquignaz, and then Gonella, between Croux, and Botta, and last, Sella with De Fillippi and Pellissier — all silent, evidently moved by the realization of this hard undertaking; every one intensely conscious of this last



MOUNT ST. ELIAS.
From a photograph by Israel C. Russell.

attempt, consulting the barometer and the direction of the wind every instant. The last ridge is split with a cut in the ice, and the fresh snow is very fine, leaving at intervals an uncovered space of hard snow, in which the guides cut the steps, Petigax and Maquignaz at the head, relieving each other every hour, while the members ascend as rapidly as the way is open. Soon, across the cut in the ice, the snow is not so soft. The day clears up and the peaks look silvery. Very fine snow blows in their faces at intervals, while the first rays of the sun gild the top of Newton, and about twenty miles distant emerges the imposing peak of Logan. The ascent is made in very calm weather, with an ideal temperature, rare in the mountains, without perspiration or cold.

After crossing the second rocks, over a kind of black island, the instruments are disposed for observations by Cagni. The temperature is eight degrees below zero centigrade. All around is white and brilliant with pearly color. They are now higher than the top of Augusta, can see the great mass of Logan to its base, and an immense sea of ice, the largest after the Malaspina, circumscribed at the southeast of St. Elias, extending at great length on the horizon. The atmospheric pressure begins to tell on the members of the expedition, with some nausea, palpitation, and the usual fear of not being able to reach the end. At nine o'clock, at 16,400 feet of altitude, the Prince makes a halt and the party breakfasts. The march becomes now very fatiguing. One after the other feels the effect of the rarefaction of the air, with some headache, difficult breathing, and general weakness.

The Prince at the head leads the way, and proceeds cautiously, trying to keep the men all together. The ascent is uniform, without difficulty, but notwithstanding that, begins to affect everyone with the exhaustion which precedes the end of a serious undertaking. Every step

seems to be the last, and every fifteen minutes the party is obliged to stop for five or six minutes. All at once appears the great point covered with snow, and the members hasten up, taking breath every ten minutes. They follow each other perfectly exhausted and unconscious yet that they are there. One hundred and sixty feet from the top, Petigax, who is at the head, stops to give way to the Prince, telling him, "It is for you to touch the top first, as you deserve it by your perseverance." His Highness steps to the top of St. Elias, and all the others run, anxious and exhausted, to join him in the hurrah. The victory is complete, and it is all Italian. All ten have accomplished the purpose for which they left their own country.

No one can describe that moment. Many of those men, who for thirty-eight days had struggled to stand the trying ordeal, sobbed like children. Their anxiety, their exhaustion, the palpitation, disappeared in that moment of enthusiasm. It was 11:45 of the 31st of July, and the Italian flag was waving, hanging to a post, while the little crowd stood cheering Italy and the King.

The temperature is twelve degrees below zero, centigrade. The mercurial barometer points to 385 MM., and with the correction shows an altitude of 18,086 feet above the sea level, closely approximate to that of 18,080 feet, calculated in 1891 by Russell with triangulation. All the other determinations were erroneous. The only one which approached it was the one taken from the sea in 1792 by the Italian navigator, Malaspina, of 17,843 feet.

The ascent lasted ten hours and a half, climbing 5802 feet. According to the calculation of his Highness, deducting from the total time only half an hour lost in making observations and half an hour for breakfast, in the first five hours there were climbed 3310 feet, with an average of 662 feet to the hour, while the last four and a half hours only 2391 feet were climbed, with an average of 531⅓ feet to the hour.

The horizon was beautiful and very clear. At 1:15 P. M. the expedition started back, and at five the party of the Prince, which had preceded, stopped for the other, and the next day, the first of August, without incident, the expedition reached the Newton, and the 3d day of August met again the American packers who were waiting. It was snowing, but notwithstanding that, the descent was very rapid. His Highness had arranged so that food was well distributed all along the road, and every day the expedition could make three of the previous camps, removing all that has been left. The snow was very soft and everybody plunged to the hips, so that walking was very painful. The bridges were less sure and the crevasses more frequent. The 5th of August the expedition left the valley of the Newton and the noisy rumbling of the avalanche, and the tedious trip on sleds along the Agassiz over the Dôme Pass became almost unbearable on account of the soft snow which covered everything. Between the 6th and 8th of August the expedition crossed the Seward, with snow, rain, fog, and sun only at intervals. No accident happened, thanks to the ability of the guides in dragging and carrying the sleds, which excited the admiration of the American packers.

The winter coat of the Seward which was thick with snow one month previous, has disappeared; the snow is melted, and waterfalls with small blocks of ice are seen, and rich blossoming vegetation. The 8th of August camp is set on a depression of the Hitchcock ridge, and the next day the expedition reaches the Malaspina plain. A different sight greets the eyes of the members, because the Malaspina has changed its appearance and a part of the snow melted and many crevasses opened, rendering the road very tedious and difficult; so much so that for a long way they are obliged to walk in the muddy snow to the knee. The trace of the sleds cannot be found, and the Prince is obliged to head the caravan with a compass, so as

to reach the coast at the same place where they had disembarked. At 1 P. M. of the 10th they are in view of the Bay of Yukatat, where the "Aggie" arrived in the morning from Port Mulgrave, and is in waiting under full sail. The arrangements made by his Highness were perfectly correct, as he had ordered the schooner to be there between the 10th and 11th of August.

In six hours the bare surface of the Malaspina was crossed with the sleds, running very rapidly, only at intervals receiving some shock by the unseen crevasses; and after crossing the three ridges and pulling the sleds with all their force, the party stopped, tired of the long march, between the rocks and the mud of the last ridge, near some provisions which had been left by the last camp of the Bryant expedition. For the first time they slept on stone, after forty days of life spent on the snow. They had descended in ten days over all that zone of glacier which it took thirty days to cross before.

At noon of the 11th began the embarkation, and on the morning of the 12th, at 8 o'clock, the Prince left the landing. They spent the forenoon at Port Mulgrave, and the morning of the 13th of August they left, under full sail, for the return. The weather was beautiful, and the majestic chain of mountains splendid under the rays of the sun. After four days of rest on the deck of the schooner, they reached the Bay of Sitka, the 17th of August, fifty-seven days after they had left it.

The return to Europe was rapid. First on the "City of Topeka" to Seattle, and then across Canada to Niagara Falls and to New York, whence they left at 11:30 A. M. of the 4th of September on the "Lucania."

The party dissolved in London on the 11th of September, after four months of companionship.

ON MT. LEFROY, AUGUST 3, 1897.

By C. S. Thompson.

In the early spring of 1896, Mr. Philip S. Abbot invited his friend, Professor Harold B. Dixon, of Owen's College, Manchester, Eng., to climb with him, at some future day, among the Canadian Rockies. In consequence of that invitation, and its delayed acceptance, there is now, on the southern end of the summit ridge of Mt. Lefroy, overlooking certain cliffs, a small, hastily erected cairn. Thrust into a crevice, between two foundation stones, is a brass pocket match safe, containing a soiled, much-folded slip of paper, upon which is written: "On the summit of Mt. Lefroy, Aug. 3d, 1897: H. B. Dixon, J. Norman Collie, C. E. Fay, Arthur Michael, C. L. Noyes, H. C. Parker, J. R. Van Derlip, C. S. Thompson, Peter Sarbach, guide."

About three o'clock in the morning we pulled away from the wharf in front of the Lake Louise chalet. The night was dark, clear, and cold, almost frosty. To right and left before us were the profile masses of the Beehive and of Goat* Mountain; between them, up the valley, the ghostly white shapes of Mt. Lefroy and Mt. Green; behind, the lonely chalet and the radiance of the morning star. The all-including silence was broken only by the creaking of the rowlocks and the steady dip of the oars in the quiet water. At the

* The Canadian Topographical Survey has recently changed the name of this mountain to "Fairview," and has expressed a preference for Mt. Victoria over Mt. Green, and for Lefroy glacier over Green glacier. For the sake of uniformity with a preceding article in the *Sierra Bulletin*, I use in this, when necessary, the older names.

head of the lake we landed on a small alluvial delta, over which we moved, splashing and stumbling in the deceptive candle-light of two folding lanterns, toward a belt of woodland crossing the valley. I was somewhat in advance of the others, and in the darkness, treading with a certain familiarity through underbrush and over moss-covered stones, I separated entirely from them. Beyond this last stretch of woodland, following a dry stream bed, I picked an easy way among bowlders, distinctly visible in the growing twilight. The air freshened with the coming morning, the color slowly crept into the shadowy grass and trees, the details of glacier and precipice grew upon the mountains, the great eastern face of Mt. Lefroy was once more gray. Strangely enough, there was no sound of bird or animal, only the sibilant rush of the glacial stream, and, on the right, over my shoulder among the alders, the just audible voices of my companions. They had skirted the belt of woodland, had crossed the stream, had found the well-cut trail, and were now rapidly rejoining me.

Above the snout of the nearly level glacier, which here begins to fill the floor of the valley, the party gradually divided. Collie, Fay, and Van Derlip pushed forward along the top of the northern lateral moraine; those left behind soon turned, under the guidance of Sarbach, upon the rock-strewn ice. By this change we would, in ordinary seasons, have outstripped our more swift-footed companions. This summer the warm July rains, abnormally heavy, had melted the hitherto abundant snow bridges, so that by the time we reached the very moderate ice fall which marks the open end of the frozen amphitheater at the head of the valley, we were involved in an apparently endless maze of crevasses. Skirting these — to right, to left,— cutting an occasional foothold on their nearest margin, we jumped, with no downward glance, from one sland of ice to another. Once only, we tied ourselves to

the rope and thus were safely jerked forward one by one, in midair leap, by Sarbach, who had gone before us to the farther side. Some distance ahead, Collie, Van Derlip, and Fay were dancing to the same tune.

Beyond the crevasses, where the early spring avalanches from the encircling mountains pound the glacier into a solid mass, we turned gradually southward, toward Abbot Pass. Four thousand feet above the sun was shining upon the upper snows of Mt. Green; with us, between the remarkable walls that guard the entrance to the lower slope of the pass, the air, cold and damp, was still gray with the last traces of the dawn. Our ascent was never easier; first, over two terraces built of a rubble of ice blocks, cemented by their powdered fragments, then over a third, covered with a fresh snow that effectually blocked all crevasses. As we rose, the unforgotten western face of Mt. Lefroy came fully into view. There, again, was the familiar ice slope, divided vertically into three streams by intermittent buttresses of curiously rotten limestone. The angle of ascent, modified, doubtless, in memory, seemed steeper; the covering of fresh snow, concealing the grayer ice, except in two places, promised a safer, less difficult climb, than that of the year before. We ate a second breakfast, seated on the scree at the summit of the pass.

Here our more serious work began. Dividing into three groups, each group upon a separate rope, we turned directly up the face of the mountain, at right angles to our former course. For some now forgotten reason, our rope, on which were Collie, Parker, and myself, was detained in the pass several minutes after the departure of the others. Following up a small hill of great stones piled against the mountain, we came upon the snow slope directly under the southern line of buttresses, toward which our friends, under the guidance of Sarbach, were slowly rising. The snow, dry but compact, gave good footholds—needful, for the slope was

as steep as the steepest house roof, and growing steeper. Passing to the right of the lowest and most isolated of the buttresses, we came shortly to the second, readily surmounted by a narrow ladder of snow held between it and a satellite ledge upon its right flank. From the top of this improvised ladder, keeping always on the northern edge of the most southerly of the three ice streams, the one along whose farther margin we had labored so desperately just a year before, we held a steady course upward to the third buttress. There the two leading ropes, following Sarbach, had changed snow for rock, and with much caution, were edging up its shattered face. Even with their utmost care, two or three stones flew by us and ricochetted down the slope. Swerving again to the right, partly to avoid the missiles, partly because we judged this course the easier, we kept determinedly upon the snow. Accordingly, when the others returned to the margin of the ice stream at a point somewhat below the foot of the fourth buttress, we fell into line ahead of Michael, Noyes, and Van Derlip, and directly behind Sarbach, Dixon, and Fay. No place in all our climbing required greater care. We were standing, one above another, on an ice slope covered with less than two inches of snow, and exceedingly steep, so steep that at times it seemed as if Collie's shoes would graze my face. Below, the snow-covered ice, slightly concave, fell like an admirably adapted chute toward a precipice overlooking the gorge beyond the pass. Above, there was the sound of Sarbach's ice axe, step-cutting, and, out in the center of the ice stream, a grim patch of gray, glistening in the surrounding white. Upon such a slope our movement was necessarily slow. Time and again, in the leisure of those moments, I looked across that narrow ice sheet to a line of low broken ledges, the path of our last year's party, the path that we too must have taken but for the favoring snow. The cliffs where Abbot fell were very near, and the chimney



ABBOT PASS, FROM FOOT OF MT. NICHOLS.



THE SUMMIT RIDGE OF MT. LEFROY, FROM SOUTHERN TURRET.

up which he so resolutely climbed was fully in view. Somewhere at its top, at some point plainly visible, the friable rotten limestone had cracked beneath his hold. I lived that day again.

Above this fourth buttress the snow, most fortunately, became deeper, but the angle of the slope, instead of moderating, as we had expected, became disappointingly greater.* We clung to the mountain side like flies. Once more Sarbach's rope decided that rocks were better than snow, and forthwith assaulted the fifth buttress, the highest and least formidable. To this point our path had been not more than fifty feet south of the continental watershed in British Columbia; now, traversing a band of snow below the buttress upon which Sarbach's party was scrambling, Collie, Parker and I crossed to the southern margin of the middle ice stream, in the territory of Alberta,† and moved upward thereon. The end was at hand. Resting on our axes until Sarbach could resume the leadership, we again followed, still always upon the snow. As we went, we passed a stone loaded with frost feathers. It had been a winter's night upon the summit.

A ridge, or razor edge, over which the snow swept in cornices that overhung the precipices of the eastern face; at either end a low turret, like a crumbling chimney on the roof-tree of an old manse: this is the summit of Mt. Lefroy.‡ Toward the southern turret, where the watershed turns abruptly from ridge to pass, Abbot, Fay, Little, and I had gazed with unsatisfied desire half a summer's day. Upon it our party now gathered — thirsty, tired, silently triumphant. There we remained, seated astride, from twenty minutes past eleven until half-past twelve.

As far as the eye could see through an atmosphere

* Collie estimated the angle of the slope at 65°.

† On this face of Lefroy the line of division between the watersheds is almost imperceptible, and, at times, difficult to determine.

‡ Barometric altitude (mercurial), 11,425 feet.

unsurpassedly clear, there were mountains beyond mountains, without end. Among them we recognized familiar shapes, Hector, the great ark Assinniboine, and the towers of Goodsir; nearer, the pyramid of Temple, and Hungabee, the chieftain, with his ten men, Heejee, Saknowa, Sagowa, Neptuak, and all the others curving in Indian file behind him. Across the hidden valley of the Columbia, southwestward, were the vast snowfields of the southern Selkirks, yellow in the distance. For a radius of a hundred miles the world was ours, a wilderness of uncultivated valleys, of peaks and glaciers.

As the sun was slowly changing the snow on the western slope into a granular, treacherous mass, which slides upon such an inclination with the slightest disturbance, like flour or finely bolted starch, there was some danger in remaining long where we were. Sarbach, Dixon, and Fay were the first to move, returning, as they had come, by the face of the fifth buttress. Curving by this upon the snow, I saw Sarbach, like a nineteenth century Porthos, seated at the top of what, by courtesy, might be called an exceedingly shallow chimney, his feet braced like a divided pair of compasses, around his waist the knotted end of an Alpine rope, along whose extended length Fay and Dixon performed most circumspectly all manner of unexpected contortions. Then our own footing demanded immediate attention, and for more than an hour they were hidden from our view. We moved, one at a time, backwards, as if going down a steep ladder, pounding our feet well into the softening, but easily compacted snow, and at each step driving in the handles of our axes almost to the head. The passage down the ice steps, the engrossing nature of our occupation, and the exhilaration of the descent, after a successful ascent, prevented this mode of progression from being wholly monotonous. I admit, indeed, a slight feeling of regret as we faced about at the

foot of the lowest buttress and glissaded to the pass. There we variously disposed of ourselves. Collie crawled to the end of a rocky promontory jutting into the Pacific Slope, where he closed his eyes in apparent slumber; Parker busied himself with photographic and other scientific observations, while I cut bits of fat and portions of the browned salted exterior from a roast of mutton, and ate them ravenously. Half way up the mountain, certain small black figures were moving imperceptibly downward. An hour later we were all once more safely on the pass.

There is little more to tell. Leisurely, much behind the others, Collie, Parker, and I descended to the Green glacier, and crossed it to the foot of Mt. Nichols. There, on the highest point of the lateral moraine, not far from the spot where our party of August 5th in the preceding year had finally left the ice, we sat down to rest. On that day, looking back, I had watched a sudden rain squall drive across Abbot Pass, hiding it behind a veil of streaming gray; now I saw it, as never before, in the dazzling beauty of a sunny afternoon. The three years' struggle with Mt. Lefroy was finished.

CONIFERS OF THE PACIFIC SLOPE—HOW TO DISTINGUISH THEM.

By John G. Lemmon.

No. 2.

Our first number treated of the general classifications of the great order of *Coniferæ*, followed by groupings and descriptions of a little over a third of them,—the *Fasiculars*—Pine, Larix, and Cedar.

This article continues the classifications, grouping and describing the other subtribe of Northern Pitch trees—the *Solitares*—including the Spruces and Firs. Then follows a discussion of the tribe of *Taxodiads*, including the *Sequoia* and its allies.

The Whorl-cone Conifers, the second great division of the order, and embracing the so-called American Cedars, the Cypresses, and the Junipers,—supplemented by a discussion of the *Taxaceæ*, or drupe-fruited trees (by some authors referred to the Conifers)—will remain for a third article.

SUBTRIBE B. SOLITARIÆ.

The Solitary-coned Pitch Trees—Spruces and Firs.

Very resinous and evergreen trees of the Northern Hemisphere, with all the leaves solitary, not in fascicles or tufts, and all very short; male flowers solitary, spike-like, or globular; cones maturing in one season, with two seeds upon each scale, mostly broadly winged. Separated by the position and direction of the cones into two classes—Pendant-fruited and Erect-fruited Solitares.

From photographs by John G. Lemmon.



SHASTA FIR—Abies—*Shastensis.*



DOUGLAS SPRUCE—*Pseudotsuga taxifolia.*

From photographs by John G. Lemmon.

CLASS A. PENDENTES — PENDANT-FRUITED SOLITARES.

THE SPRUCES.

Beautiful evergreens, yielding tough timber; cones small, elongated, pendant from or near the ends of the branchlets, not confined to the upper limbs, but borne by any of them; scales persistent upon the axis, like those of the pine, not deciduous like the true fir, the edges thin, rounded, not bearing protuberances or prickles, a thin, flat, leaf-like appendage (bract) attached to the back of each; spikes or heads of male flowers solitary, terminal, or scattered. Three (or, with *Hesperopeuce*, four) genera, in two sections:—

SECTION 1. INCLUSÆ — NAKED-CONE SPRUCES.

Cones terminal or next to a terminal leaf bud, the small, undeveloped bract included by the growing scales; leaves promptly deciduous in drying; branchlets roughened by the coils of short, peg-like, ligneous leaf-bases *(pulvina)*, left by the falling leaves — this latter character readily revealing the trees of this large group. Two genera:—

THIRD GENUS. PICEA — THE TRUE SPRUCES.

Stately and valuable lumber and ornamental trees of mountainous and northern regions; branches very rough, caused by the prominent pulvina; seeds without resin-vesicles. Sixteen known species, five in Northwest America, in two groups:—

GROUP 1. NORTHCOAST SPRUCES.

Two easily distinguished species:—

1. **Tide-land Spruce** (*Picea Sitchensis*, Trautv and Mayer).— Large pyramidal trees, attaining 150 to 200 feet in height, with a diameter of eight to twelve feet in its head-quarters along the fog-drenched Lower Columbia, extending, with smaller trees, northward to Alaska, southward to

Mendocino. Bark thin and flaky; branchlets thick, rigid; cones cylindrical or narrowly elliptical, one and one-half to two and one-half inches long, yellowish; scales elliptical, notched at apex; bract large, lanceolate, six centimeters long; leaves flat, scattered, pungent, young ones whitened above with lines of stomata; the pulvina two centimeters high.

2. **Weeping Spruce** (*P. Breweriana*, Watson).— Beautiful trees of small size, and extremely local; recently discovered on the west end of the Siskiyou Mountains, about twenty miles from the ocean; a few trees on nearby mountains, north and south. Readily distinguished by its long, slender, drooping branchlets, six to eight feet long, and its peculiar cones, narrowly elliptical, two to three inches long, narrowed with many empty scales to each end.

GROUP II. INTERIOR AND SOUTHERN SPRUCES.

Three species, difficult to distinguish:—

3. **Columbian Spruce** (*P. Columbiana*, Lemmon). *N. Sp.* —Medium sized trees of the Columbian region, with headquarters on the Cascade Range of Washington, where it attains a height of seventy-five to one hundred feet, with a diameter of three to five feet, extending, with smaller forms, southward to Oregon, eastward to Idaho and Montana, northward to British Columbia, with dwarfed specimens in Alaska. Bark light-colored, thin, hard, and flaky; branches short, especially those on the upper half of the tree; branchlets slender, two to three millimeters thick; cones small, narrowly elliptical, one and one-half to two and one-half inches long, yellowish; scales obovate, thin, edges wrinkled, scale bracts small, acute, three to four millimeters long. Recently separated* from Engelmann's Spruce, a much larger tree with many different characters, inhabiting a more southern region.

* *Garden and Forest*, May 12, 1897.

4. **Engelmann's Spruce** (*P. Engelmanni*, Parry.).—Becoming large trees, 100 to 150 feet high, and four to six in diameter, in its headquarters on the Rocky Mountains of Colorado, at elevations of 5000 to 12,000 feet, ranging northward, in smaller forms, to Wyoming, southward to New Mexico and Arizona, and westward to Utah. Spindle-form trees (the upper limbs larger than the preceding), with thick, brown bark, deeply furrowed; branchlets more robust than preceding; cones brownish, larger, elliptical, two to three inches long; scales rhomboid, thicker and firmer; bracts larger and truncate or spatulate.

5. **Blue Spruce** (*P. pungens*, Engelm.).—Small trees, along streams or in wet places, rare and local in a few localities of Wyoming, Colorado, and Utah, at lower altitudes than the preceding, and never forming exclusive forests. Foliage strikingly light green or bluish; the leaves rigid and pungent—characters that usually distinguish the species.

Fourth Genus. Tsuga—Hemlock Spruces.

Branchlets roughened by pulvina, but not so markedly as in the true spruces; cones terminal, small; leaves petioled or stalked, each with a single resin duct along the back; seeds with resin vesicles on upper surface. Male flowers in globular clusters, terminal or scattered, raised at maturity out of the bud by a half-inch stipe. Six known species; two in our North Pacific region (or one only if *Hesperopeuce* is maintained):—

1. **Western Hemlock** (*Ts. Mertensiana*, Carr.)—Picturesque pyramidal, often very large trees; headquarters in the great fog-nurtured forest along Puget Sound, where it attains a diameter of eight to twelve feet, extending through British Columbia to Alaska, southward through Washington and Oregon to Northern California. Distin-

guished by its light-green foliage of short, flat leaves, in two ranks, bordering pinnate branches forming broad horizontal or declined sprays, the little ovate half-inch cones, like tassel buttons, fringing the whole. This species very similar to the hemlock of the Eastern States and Canada, and the two Chinese species, but widely different from the next.

2. **Alpine Hemlock** (*Ts. Pattoniana*, Engelm.). (*Hesperopeuce Pattoniana.* Lemmon).—Often very large, six to ten feet in diameter, always exceedingly graceful trees, in scattered groves of alpine or sub-alpine forests in the Sierra, Cascade, and Northern Rocky Mountains. Detected at sight, by their dark-green foliage, the spire-like outline, the slender sprays of foliage, each branch tapering to a slender shoot that sways with every breeze. Cones largest of the genus, narrowly elliptical, one and one-half to three inches long, purple until ripe, then light brown; the scales usually reflexed; leaves quadrangular, usually somewhat tufted, resin duct very large; pollen grains bilobed.

This lovely Alpine Spruce has so many aberrant and peculiar characters that the writer published it once as the type of a distinct genus.*

A variety (*Hookeriana*, Lemmon) of smaller trees with shorter upper branches—rendering the tree sharply pinnacled—cones one and one-half inches long; scales not reflexed at maturity; extends from the Northern Cascades and Northern Rockies through British Columbia to Alaska.

SECTION 2. EXSERTÆ — FEATHER-CONE SPRUCES.

Cones subterminal, the scales strongly convex, bracts membraneous, one fourth of an inch or more wide, greatly developed and long exserted, about an inch long, trilobed, the middle one being the extension of the strong awl-shaped midrib, the side ones cuneate, acute; buds of both kinds

* *Hesperopeuce Pattoniana*, Third Report, State Board Forestry, 1890.

From photographs by John G. Lemmon.





ALPINE HEMLOCK—*Tsuga Pattoniana.* ENGELMANN'S SPRUCE—Picea—*Engelmanni.*

From photographs by John G. Lemmon.

very large; one-fourth to one-half inch long, of few large brown scales; leaves petioled, flat, on young trees in two ranks, mostly scattered, not standing on pegs, nor promptly deciduous. One genus, peculiar to our western region:—

FIFTH GENUS. PSEUDOTSUGA.—FALSE HEMLOCK SPRUCES.

Comprising the largest and most valuable spruce trees in the world. Cones ovate or elliptical, light brown or darker; leaves one to two inches long, whitened beneath with stomata, and each with two longitudinal resin ducts. Two species:—

1. **Douglas Spruce** (*Ps. taxifolia*, Britton.) — Large, strong-timbered trees of wide distribution, but limited to our Pacific region, forming the greater part of the dense forests around Puget Sound, where it attains the enormous diameter of twelve to fifteen feet, with a height of 300 to 450 feet. It extends, with less dimensions, northward to Alaska, eastward to the Rocky Mountains, southward on both coast and interior ranges, with many wide gaps, far into Mexico. Bark very thick on large trees, and deeply fissured, black or reddish. Lower branches often sending out long, slender, drooping, branchlets, six to eight leet long; this form especially common in the high, moist regions around Yosemite, and northward to Shasta. Cones two and one-half to three and one-half inches long, light brown, beautifully decorated with the three-parted, feather-like bracts, by which it may always be readily distinguished. Very strong and serviceable timber, variously designated by lumbermen as Red Fir, Yellow Fir, and Oregon Pine.

A small form of this tree, with spongy, corky bark, small cones, one and one-half inches long, and short, scant leaves, is found on the peaks of Northern Arizona, at elevations of 9000 to 10,000 feet. This form was recently published as a marked variety — the Cork-bark Spruce.*

* *Ps. taxifolia*, var. *suberosa*, Lemmon. Erythea, vol. 1-48, 1893.

2. **Big-cone Spruce** (*Ps. macrocarpa*, Lemmon).—Smaller, less symmetrical trees, larger limbed, and with darker and much larger cones — largest of the spruces — five to seven inches long, half as wide when opened; the scales firmer and thicker; bracts firmer; seeds very large, with half-inch wings. A local species limited to the San Bernardino and neighboring mountains; particularly distinguished by its magnificent and beautifully feathered cones. First separated from preceding and published by the writer in 1879,* and repeated frequently before its appearance in the Forestry Report of 1890.†

CLASS B. ERECTES.—UPRIGHT-FRUITED SOLITARES.

THE FIRS.

Mostly becoming large trees; branches arising annually in symmetrical horizontal whorls or circles of three to nine, pinnate again and again, forming fan-like strata of dense foliage; leaves short, mostly in two ranks; cones maturing in one season, either erect (or arrect, becoming erect in the Chinese fir); scales and bracts deciduous, leaving the cone axis standing on the limb. Two genera: one (*Keteleeria*) peculiar to China, the other widely distributed and particularly abundant on the Pacific Slope.

SIXTH GENUS. ABIES—THE TRUE FIRS.

Cones cylindrical, or nearly so, and oblong, of many compact scales, erect upon the uppermost limbs, taking the place of branchlets (very plain illustrations of the fact that all cones are but condensed and much modified branches). The bracts are membraneous, and at first much larger than the scales, in some species remaining undeveloped, in others greatly enlarged and long-exserted; scales numerous, wide above and slightly convex in the exposed part, but unarmed, deciduous with the persistent bracts at maturity; seeds with

* *Tsuga macrocarpa*, in *Pacific Rural Press*, Feb. 8, 1879.

† *Pseudotsuga macrocarpa*. Third Report, State Board Foresty, p. 134, 1890.

resin vesicles, and three fourths covered by the clasping base of the broad wing. Male flowers oblong, colored, scattered, solitary in the axils of last year's leaves; these mostly twisted at base to bring them into two ranks.

The firs are readily detected, the world over, by their symmetrical layers of branches, diminishing in size from base to apex, and by the prim, erect cones, the scales falling away at maturity. Of the ten western species several are closely connected, therefor, difficult to distinguish. May be divided, for convenience, into three groups:—

Group I. Northern Firs.

Extending from Alaska southward to Northern California, and along the Rockies to Colorado. Cones of the northern species dark colored; leaves mostly flat. Four species:—

1. **Sub-Alpine Fir** (*Abies lasiocarpa*, Nuttall).—Small spire-shaped alpine and sub-alpine trees of the high peaks in Alaska and British Columbia; southward in larger forms, and in detached groups to Colorado and Oregon. Bark thin, smooth, milk-white outside; cone very small, narrowly elliptical, two to three inches long, purple, with short, tangled hairs. Male flowers red, conspicuous.

2. **Lovely Fir** (*A. amabilis*, Loud.).—Larger, full-crowned trees, in detached groves on mountain slopes, or sub-alpine, from British Columbia southward to Oregon, —especially abundant on the slopes of Mount Hood. Bark gray, one to two inches thick; cones strictly cylindrical, oblong, three to four and one-half inches long, dark purple, shining; scales striated within, cartilaginous (retracting with great force when confined in making botanical specimens); leaves dark green, flat, crowded upon the branchlets. Male flowers crimson, conspicuous, beautifully decorating the borders of the sprays of foliage.

3. **Noble Fir** (*A. nobilis*, Lindley).—Very large trees, six to ten feet in diameter, and 200 to 300 feet in height, on the Cascade Mountains near Mount Hood, southward nearly to California, and on the Coast Range from the Columbia nearly to the Siskiyou Mountains. Bark thicker, brownish; cones brown, very large, nearly cylindrical, five to seven inches long; scales numerous, narrow as compared to others, the brown bract membraneous, a half inch wide, very long, protruding one-half to one inch, strongly reflexed, the subulate midrib almost black. Noble trees, distinguished by their limited habitat and peculiar cones. Excellent timber trees, manufactured in Oregon under the name of "Larch."

4. **Oregon White Fir** (*A. grandis*, Lindley).—Large trees of the Northwest, in moist localities, abundant in the region of Puget Sound, mingled with Douglas Spruce, southward to the Mendocino coast. Bark usually thin, finely checked, dingy white or darker; cones dark green, narrowly oblong, two to three inches long; bract undeveloped, hence concealed; leaves mostly in two ranks, one to one-half inches long, dark green, and shining above, conspicuously whitened below, with numerous lines of stomata.

GROUP II. CALIFORNIA FIRS.

Varied trees, some of the largest size, limited to the mountains of California. Cones lighter colored. Four species:—

5. **California White Fir** (*A. Lowiana*, Murr.).—The most abundant of the California firs, extending a little way over the line into Oregon, southward, on both the Sierra and Coast Ranges, to Southern California. Often attains a height of 150 feet, with a diameter of four to six feet. Bark whitish, thick, and fissured; cones light green until maturity, then yellowish, oblong, two and one-half to three and one-half inches long; bracts concealed; leaves quite long, one

to two inches, mostly in two ranks by a twist at base, slightly whitened below. This tree is, by some authorities, referred to *A. grandis*, from which it is separated by habitat, fruit, and foliage. Others refer it to *A. concolor*, as was done in our Forestry Report, and the recently published hand-book,* but it may reasonably be regarded as distinct.

6. **California Red Fir** (*A. magnifica*, Murr.).— Magnificent trees, attaining, in the high Sierra, the largest size of any of the genus, eight to twelve feet in diameter, with a height of 200 to 250 feet, in dense forests trimming themselves to a height of 100 feet or more, thus presenting a shaft of imposing size, supporting the great crown of stratified limbs, surmounted, in the autumn, with circles of matchless cones. Quite local in the middle Sierra, from Plumas to Kern counties, often mingling with the preceding, but usually at higher elevations of 8000 to 10,000 feet. Readily detected by its very thick bark, two to four inches, deeply fissured, brown without, dark red within (detected by cutting or breaking — this character giving the tree the name of Red Fir), and the very large, light purple cylindrical cones, largest of the genus, six to eight inches long and half as thick; bracts usually enclosed, or rarely slightly exposed; leaves quadrangular, not twisted nor in two ranks, those on upper limbs short and close-wrapped, giving the branchlets almost the appearance of nakedness.

7. **Shasta Fir** (*A. Shastensis*, Lemmon). *N. Sp.*— Medium sized trees eighty to one hundred feet high, two to four feet thick, with some characters similar to preceding, but sufficiently distinct. Bark thinner, finer checked than the preceding; cones smaller, darker, inclined to be elliptical, rather than cylindrical; scales more protuberant at apex, the bract broadly cuneate and cuspidate, usually developed to a great size, protruding one-half to one inch from between the

* Third Rep. State Board Forestry, p. 148, 1890, and Hand-book West-American Cone-bearers, 3d ed., 1895.

scales. Forms a dense, almost exclusive forest, on the high lava plateau of Mount Shasta, with a few trees scattered on the volcanic summits of neighboring peaks.

Has been confounded with the preceding—*A. magnifica*—but Dr. Murray founded that species upon very different trees growing "on the high, unexplored part of the Sierra Nevada to the eastward of San Francisco." Published as a variety of the Magnificent Fir, 1890, and recently raised to the rank of a species.*

Another form—var. *xanthocarpa*, Lemmon, the "Golden Fir," becoming of large size, with thinner bark than the preceding, finer checked; cones smaller, and dark yellow, with long, lighter colored bracts. Found on the southern slope of Shasta, at about 9000 feet altitude. The golden cones are unique in the genus.

8. **Bristle-cone Fir** (*A. venusta*, Koch).—Small, slender, pinnacled trees, few in number, local upon certain slopes of the higher Santa Lucia Mountains, near the Monterey line. Cones oval or elliptical, two and one-half to three and one-half inches long, with firm scales, the broad bracts barely concealed, but the strong midrib greatly prolonged, one to two inches, and recurved; buds largest of the genus, one-half inch long; leaves large and broad, lanceolate, one to two inches long, much whitened beneath by many lines of stomata, mostly in two ranks, with twisted bases,—all very distinguishing characters of this most beautiful of the firs, which the discoverer, David Douglas, not inaptly, named *venusta*, in honor of the goddess of beauty, Venus; but as all these Northern pitch trees were called pines in his day (1831), subsequent separation of the genus, and founding of new genera, required that his name of *Pinus venusta* must be changed to *Abies venusta*, and Professor Koch was the first to do this—hence, under the

*A. *magnifica*, var. *Shastensis*, Lemmon. Third Report State Board Forestry, 1890, and *A. Shastensis*, Lemmon, N. Sp., in *Garden and Forest*, May 12, 1897.

rules, the corrected binomial is to be credited to the latter person, as foregoing.

GROUP III. EASTERN AND SOUTHERN FIRS.

Two quite dissimilar species:—

9. **Colorado White Fir** (*A. concolor*, Parry).—An exceedingly white-foliaged tree, attaining a medium size in its headquarters on the mountains of Colorado, thence extending in scattered groves, southward to New Mexico and Arizona, westward through Utah, sparsely to Southern California. Bark gray, thick; leaves flat, very large, one and one-half to two inches long, whitened with lines of stomata on both sides (whence the name *concolor*), young shoots, also, hoary-whitened, the large circular leaf scars, slightly elevated, forming shallow cups; cones small, two to three inches long, pale yellow. This beautiful fir, whitened in so many of its parts, is readily detected.

10. **Arizona Fir** (*A. Arizonica*, Merriam). *N. Sp.*—A beautiful little fir, local on the San Francisco Mountains of Northern Arizona, between the altitudes of 8900 and 9500 feet, and at similar altitudes on a few neighboring peaks. Trees about sixty feet high by one foot in diameter; bark "a highly elastic, fine-grained cork, usually creamy white, with irregularly sinuous ridges"; leaves of lower branches nearly flat, three-fourths inch long, of the upper, triangular and shorter, one-half inch long; cones dark purple, very small, two inches long, three-fourths thick, the scales much broader than long; bracts and seed-wings also broader than long.

Discovered and described by Dr. C. Hart Merriam.*

Excepting the peculiarities of the bark, the characters of this fir are not far removed from *A. lasiocarpa*, to which Professor Sargent thinks it belongs, in which case it may be designated as *Abies lasiocarpa*, variety *Arizonica*, the Cork-barked Fir.

* Proc. Biol. Soc., Washington, Vol. X., Nov. 3, 1896.

TRIBE TWO. ARAUCARIEÆ—SOUTHERN PITCH TREES.

(Inserted here to complete the classification.)

Less resinous, mostly lofty trees, with branches in symmetrical whorls, one whorl or circle to each season; flowers dicœcious (*i. e.* male on one tree, female on another), or moncœcious (on same tree); cones globular; scales numerous, spirally arranged, consolidated with the smaller bract; seeds, one to six to each scale.

Beautiful trees of the Southern Hemisphere, one genus of which, *Araucaria*, is frequently found in cultivation, and just coming into bearing in California. Flowers dicœcious; cone-scales deciduous, large, and mostly armed with strong spines, each scale bearing one large seed, firmly imbedded between the scale and consolidated bract. Chief of the species cultivated are, *Ar. excelsa*, "Norfolk Island Pine," with magnificent, ample, horizontal sprays of dense foliage, consisting of awl-shaped, soft leaves, scattered all around the numerous, slender, pinnate branchlets; the *Ar. Bidwillii*, "Bidwill's *Araucaria*," with strong, cartilaginous, ovate-lanceolate, spine-tipped leaves, one and one-half to two inches long; cones very large, ovate, eight to twelve inches long, with heavily-armed scales, and seeds one and one-half inch long, and half as thick; and *Ar. imbricata*, "Monkey Puzzle," large trees of the Andes of Chili, with the formidable leaves long, persistent, and imbricated or lapped closely around the long, drooping limbs and the trunk—defying the attempts of monkeys to climb the trees—hence the very large, delicious nuts, are preserved for use, by the natives.

TRIBE THREE. TAXODIEÆ—THE TAXODIADS.

Cypress-like trees of both Hemispheres, less resinous than the two preceding tribes, but the arrangement of organs spiral like them. Includes trees of the largest size,

abundant in past ages, a few only now extant. Leaves small, scale-like or rarely linear; cones requiring one to two seasons to mature, are small, globular or oblong, mostly woody; bracts partially consolidated with the scale or obliterated; seeds, two to nine to each scale. Two classes:—

CLASS A. DENUDÆ — BALD TAXODIADS. SWAMP CYPRESSES OR CEDARS.
(Inserted to complete classification.)

Trees with small, tender, deciduous leaves; cones embossed or reticulated; scales peltate or club-shaped. Two genera, neither with representatives native to our region, but often found in cultivation. *Glyptostrobus*, the Embossed Cedar, an only species, with minute deciduous leaves; cones about the size of a hen's egg, the spirals of scales largest in the middle of the cone, the dark, separating lines give it the appearance of being in a net or reticule. A native of swampy ground, in China, where it is called by a name meaning Water Pine. *Taxodium*, Bald Cypress (largely present in early ages), is now represented by one species in the Southern States and a second in Mexico. Branchlets slender, and elegantly pinnated with delicate leaves, in two ranks, deciduous; cones broadly ovate, one to one and one-half inches long, hard, with an uneven surface. The Bald Cypress of the Southern swamps is particularly noted for its "knees"—conical, tumor-like bodies, arising from its roots, to a height of two to three feet, covered with a smooth, red bark, like that of young trees, and hollow. The part these curious excrescences play in the economy of the parent is unknown.

CLASS B. SEMPERVIRENTES—EVERGREEN TAXODIADS. BIG TREES AND THEIR ALLIES.

Trees retaining their leaves during several years. Four genera: *Sequoia*, *Crytomeria*, and *Sciadopitis* — the two last-named Southern and Oriental trees, often met with in cultivation, hence needing brief descriptions:—

The *Cryptomerias* are beautiful, pyramidal trees, often of great size, like those planted hundreds of years ago, around the temples of Japan. They resemble our big *Sequoias*, but may be at once detected by their early bearing habit, trees being filled with fruit at a foot or two in height; cones globular, about a half inch in diameter, the scales palmately divided at the edge, so that the open, ripe cone is somewhat prickly. The *Sciadopitis*, a solitary species from Japan, is distinguished by its verticillate or umbrella-like rays of "cladoles," these being modified branchlets, performing the office of leaves, two to four inches long.

Chief of the Evergreen Taxodiads is the chief of all trees in size—the great Redwoods belonging to the remarkable Western:—

SEVENTH GENUS. SEQUOIA—REDWOODS, OR BIG TREES.

Largest and noblest trees known, peculiarly confined to the limits of California. Cones oval; seeds like those of a parsnep; scales arranged in three coils, each an obpyramidal or cuneate section, the point inwards, entering the cone axis, the apophysis, or exposed part, rhomboid, slightly embossed, with a depressed, transverse line, and a central seta or bristle (when young), about a fourth inch long, the scales, when maturing, shrinking a little to discharge the numerous seeds, but not changing position; seeds four to nine to each scale. Male flowers, yellow, about one half inch long, axillary upon young shoots—these, as well as those of the cones, clothed with short scales.

The character and value of the wood are too well known to need further mention. About a score of species are known by their vestiges to have dominated the forests in past ages. Two surviving species:—

1. **Coast Redwood** (*Sequoia sempervirens*, Decaine).—Famous lumber trees of the coast, growing in ravines and wet places, in numerous groves, from near the southern

From photographs by John G. Lemmon.



LOVELY RED FIR—Abies—*Amabilis.*



GIANT SEQUOIA—*S. Washingtoniana.*

From photographs by John G. Lemmon.

boundary of Monterey County, northward, with larger, compact bodies, to Mendocino and Humboldt Counties —a few small saplings being found just over the line in Oregon. Cones small, oblong, or oval, one-half to three-fourths inch long; scales about twenty; seeds about fifty; leaves bright green, flat, one-half to one inch long, mostly in two ranks, those on the main stems and peduncles, and usually the lower ones on the spreading branchlets, short, scale-like, and oppressed. This, the renowned Coast Redwood, is the most valuable tree of the California forests, often attaining eight to twelve or rarely fifteen feet in diameter, with an unexcelled height of 300 to 400 feet, the limbless trunk, eighty to one hundred feet; bark soft, porous, very thick, six to twelve inches, deeply fissured longitudinally.

Trees remarkable for tenacity of life, roots and stumps readily sprouting, adventitious buds arising, even from the heart-wood of burned stubs. Forest being removed by lumbermen with most efficient and expeditious machinery. Probably not a single unprotected tree will be left standing fifty years hence.

2. *Sierra Big Tree* (*S. Washingtoniana*, Sudworth).—Gigantic trees with straight, comparatively smooth, columnar trunks, 300 to nearly 400 feet high, and twenty to thirty, even forty feet in diameter. Strictly limited to the western slope of the Southern Sierra, in half a hundred groves, or forming larger forests of 2000 to 5000 acres, beginning with a small, lately discovered grove in Placer County, at an elevation of 5000 feet, extending southward in detached groves, as at Calaveras (the first discovered grove), 4700 feet, Tuolumne 5500 feet, Mariposa 6000 feet, to the numerous groves and larger forests at higher elevations, in Fresno and Tulare Counties.

This colossal Washington tree, unmatched in all the world for the size and uniformity of its stupendous column,

and the thickness of its bark (one to two feet), differs from its only living brother, the Coast Redwood, beside the points named, mainly in having softer, darker colored wood, and softer and thicker bark, larger cones, which are ovate, about the size of a hen's egg, the seeds numerous, 150 to 200 to a cone; leaves small, scale-like, rigid, acute, and scattered; branchlets pendulous; also, this tree is not so tenacious of life, and does not sprout from the stump or roots. Trees of a preceding generation (as shown by their stubs or bits of trunk in almost every grove), seem to have attained the enormous age of 4000 to 5000 years. As all the present generation have the appearance of vigorous youth, with full crowns of limbs, and seldom a hollow trunk, and as they are now most of them protected in reservations, it is probable that many of them will reach or exceed any age yet predicted upon ring-countings of ancestors.*

(To be concluded.)

* For an account of the change of the name of this famous tree from *Sequoia gigantea* to *S. Washingtoniana*, and the reasons therefor, see late article in Sunday *Call*, San Francisco, June 13, 1897, and republications (with corrections and additions) in *Oakland Enquirer*, June 16, 1897, and *Pacific Coast Wood and Iron* San Francisco, November, 1897.

CONSPECTUS OF THE SPRUCES, FIRS, AND SEQUOIAS.

			GENERA.		PACIFIC COAST SPECIES.
SUBTRIBE B—SOLITARIÆ (of the Tribe Abietineæ). Evergreen, with solitary, short, linear leaves; cone-scales, leaves, etc., in spirals. The Spruces and Firs.	CLASS I. PENDENTES—Pendent-cone Solitares. The Spruces.	Inclusæ. Cones naked.	Picea—True Spruces.	Coast Species.	1. *Sitchensis*..... Tide-land Spruce. 2. *Breweriana*.....Weeping Spruce.
				Interior Species.	3. *Columbiana*.....Columbian Spruce. 4. *Engelmanni*.....Engelmann Spruce. 5. *Pungens*.....Blue Spruce.
			Tsuga, The Hemlock Spruces.		1. *Mertensiana*.....Western Hemlock. 2. *Pattoniana*.....Alpine Hemlock.
		Exsertæ. Cones feathered	Pseudotsuga, False Spruce.		1. *Taxifolia*.....Douglas Spruce. 2. *Macrocarpa*.....Big-cone Spruce.
	CLASS II. ERECTES—Erect-cone Solitares. The Firs.	False Fir. Scales tardy.	Keteleeria, Chinese Fir.		
		True Fir. Cone-scales deciduous.	Abies—True Firs.	Northern Firs.	1. *Lasiocarpa*.....Sub-Alpine Fir. 2. *Amabilis*.....Lovely Fir. 3. *Nobilis*.....Noble Fir. 4. *Grandis*.....Grand Fir.
				California Firs.	5. *Lowiana*.....California White Fir. 6. *Magnifica*.....California Red Fir. 7. *Shastensis*.....Shasta Fir. 8. *Venusta*.....Bristle-cone Fir.
				Southern Firs.	9. *Concolor*.....Colorado White Fir. 10. *Arizonica*.....Arizona Fir.
TRIBE TWO. Araucarieæ. Southern Pitch Trees.			Araucaria. Etc., Etc.		
TRIBE THREE. Taxodieæ—The Taxads. Of both Hemispheres.		Denudæ. Leaves deciduous.	Taxodium. (Eastern.)		
		Sempervirentes. Evergreen.	Sequoia—Redwoods.		1. *Sempervirens*....Coast Redwood. 2. *Washingtoniana* Big Tree.

A WOMAN'S TRIP THROUGH THE TUOLUMNE CAÑON.

By Jennie Ellsworth Price.

It was late in July when our party of four, Mr. W. F. Reid, Mr. Theodore Solomons, Mr. Price, and myself, gazed from the top of El Capitan into the Yosemite Valley. We had left roads and stages, footprints and dust, behind at Gin Flat, whither we had journeyed by foot from Hodgdon's, and had followed across country, through forests and meadows, into cañons, over ridges, until we had reached the well-known paths of the tourist. After a few days in the valley, we left for the High Sierra, the Cathedral Peak trail guiding us in the direction of the Tuolumne Meadows, until Cloud's Rest was passed, where, leaving all marks of civilization behind, we made our way up the Merced River to the top of Merced Peak. Then back again, through beautiful green fields and dense pine forests, to the Merced-San Joaquin divide, and on to the summit of Ritter. But it was not until we had passed over McClure's trail into the Tuolumne Meadows, and had camped at Lake Tenaya, that we began in earnest preparations for our descent of the Tuolumne Cañon.

For many months the thought of ascending Ritter and descending this Grand Cañon had been uppermost in our minds when discussing our proposed trip, and now that four weeks of delightful experience had given us strength and courage, and having accomplished one of the desired feats, nothing could dampen our enthusiasm toward making the second a reality. So we spent the whole of the morn-

ing of the tenth of August in dividing camp provisions and packing knapsacks, for, after nearly a month of pleasant companionship, our party practically disbanded at Lake Tenaya.

Mr. Price, Mr. Solomons, and myself took the old Virginia Creek trail, which leaves the lake just back of the cabins, and started boldly on our journey. For a mile or more the way was plainly marked, but, as we advanced, only an occasional "T," the distinctive government blaze, would greet our searching eyes, and finally all traces of recent travel disappeared. At times we could distinguish blazes of years ago on the fallen trunks of dead trees, or, grown obscure, on the sides of living pines, and again even these marks disappeared, and maps were our only means of guidance. Toward the close of the afternoon we passed McGee Lake, reached the White Cascades, and, climbing to an elevation on the left of the river, gazed into the Tuolumne Cañon with greatest interest and expectancy. The scene was enchanting! The Tuolumne River, after dashing itself into foaming rapids, rushed on down the cañon in silvery masses until it spread itself out like shining ribbon amid the green foliage of the forest pines. The walls of the cañon rose ruggedly grand on either side, becoming higher and higher, closing nearer and nearer, and blending in the dim western horizon. Inspiring as was the picture, we could not linger long. So with considerable difficulty, we made our way, with our animal, down the slope along the White Cascades, and in a short time, were enjoying for a last time, until Hetch-Hetchy was reached, the warmth and comfort of our sleeping bags and blankets.

Break of day found us up making final preparations. Mr. Solomons had decided to accompany us on a photographing tour as far as Return Creek. So, after carefully staking our mule in the midst of a grassy marsh, we slung

our knapsacks and began our journey. We were all well laden, for a camera and outfit burdened one back, Mr. Price carried twenty-five pounds, five days' provisions for our party of two, his sweater, and a revolver, and I followed with a knapsack containing the cooking utensils, my jersey, and a few other articles. Its nine pounds I found as much as I could manage. In fact, at first it seemed more than I was equal to, for it took some time to get the proper bend to the back and learn to descend a rock without going head foremost, or rather, pack foremost. But experience is quickly gained in the Tuolumne Cañon, and it was not long before our loads seemed a part of ourselves.

Having camped on the southern bank of the river, we decided to descend for some distance on that side instead of taking the northern bank, along which previous trampers had made their way. But before we had traveled far, we regretted we had not crossed the river at the start, for the rocky slopes, over which we were obliged to walk, grew both steep and smooth, and we could hardly find a safe foothold, while the brush became almost impenetrable, and we made discouragingly slow progress. But we were fully compensated for the delay, for walls had now appeared on either side of the river, whose masses of granite claimed our full attention. With the "Three Brothers" on our left, "Tuolumne El Capitan" and an adjoining bluff on our right, we felt the grandeur of the cañon had not been exaggerated. The tremendous height of the wall-like face fronting on the river with almost perpendicular cliffs, and its color, vertically striped in darker and lighter yellow-grays, glistening in the morning sun, made a wonderfully striking picture. The beauty of the water enhanced the charm of the landscape; for, although only a few moments before dashing itself in wildest confusion over granite walls, it had calmed now into a silvery expanse, glistening here in

rippling diamonds, and there reflecting the glories of the overhanging cliffs.

On we went, over the glaciated surfaces of the rocks, often climbing up for several hundred feet in narrow cracks, or sliding down a distance as great, to advance only a few yards; then, scrambling over high talus and around bowlders huge as houses, and forcing a way through sharp, dense thickets—such was our course for several hours, along the mountain river, growing more beautiful in its series of small falls and cascades. Finally, about noon, we approached a point in the river where the water, as if having accumulated energy for a glorious climactic surprise, suddenly dashed over immense granite stairways in a wonderful succession of foaming cascades. The tremendous force of the water, the fearful roar, the tearing, dashing, whirling mass, beaten into snowy foam as it rushed down the granite inclines, were far more grand and inspiring in reality than any photograph could picture to the imagination. We lunched below the Le Conte Cascade, in full view of its foaming, whirling torrents, and were loath to leave the scene. A short walk brought us to the Upper California Cascade, the most beautiful and majestic of the whole series. We had great difficulty in finding a way down the glaciated surfaces of the rocks to a position near enough to see the full extent of the water. Seated finally on a buttress near the foot of the cascade, with the mist falling over us, we gazed with wonder and delight on the exulting, on-rushing mass of snowy torrent, spreading itself over waves of granite, while leaping high in the air with glorious whirls, or shifting from side to side, tossing, tumbling, roaring, with all the exuberance and sprightliness of young mountain energy. Most graceful, most picturesque, this cascade was for me the crowning glory of the Tuolumne Cañon.

Leaving our place on the edge of the buttress, against

which the whole force of the water dashes, and then, unable to advance, turns abruptly to the right, we began to descend the gentle granite slope to the left of the river. We advanced rapidly, for the face of the rock was rough, and there was no danger of slipping. Suddenly, when about half way down, we found ourselves on a glaciated surface, unable to advance or retreat one step without losing foothold and sliding upon the sharp rocks below. After many efforts, Mr. Price finally succeeded in swinging himself into a position where he had one good foothold, but I, too short of limb to follow his example, with no notch in which to place finger or edge of shoe, simply waited, with the palms of my hands tightly pressed against the rock, wondering how long I could keep myself from the fatal plunge. Just at that moment, Mr. Solomons, returning from a distance, and seeing our predicament, hastened to my rescue with a long pole, and just as I was beginning to slide, placed it beneath my slipping foot, and gave me hold firm enough to risk one step in the direction of Mr. Price, and grasp his outstretched hand.

At half past four in the afternoon, when we had reached the confluence of Return Creek and the Tuolumne, we decided to make a crossing to the north side of the river, and wandered up and down the bank looking for a shallow place to ford. The river was, however, very swift at this point, its rocky bed slippery and uneven, and we felt it would not be safe to venture with our knapsacks on our backs, for their weight might at any moment overbalance us, and not only damage provisions, but in all probability wash bag and all down stream. We finally decided to attempt a crossing over a narrow channel, where the water dashed between the walls with a rush that was terrific, and a roar nearly deafening. Near the center of the stream, dividing the channel into two parts, stood a huge bowlder, and to this rock we managed, after many attempts, to throw a small tree to serve as a footbridge. Had the farther end

of the tree rested upon a rough, flat surface, we would have experienced no difficulty, but the face of the rock was not only inclined, but smoothly polished by the water, making the crossing all the more venturesome. But, finally, summoning up our courage, though almost dazed by the rush and roar of the foaming torrent, only a few inches beneath our feet, one after another, we passed over the rounding surface of the log to the bowlder beyond. Then, crouching on the slippery rock, we succeeded in drawing our foot-bridge after us, and again made use of it in reaching the opposite shore. Landed in safety on the northern bank, we bade farewell to our fellow-traveler, Mr. Solomons, and left him to make his way with his photographing outfit up the cliffs to the north of Return Creek, while we continued our tramp down the cañon.

After an hour or more of rough scrambling through brush and over talus, we willingly confessed we had had enough experience for one day, and were ready to stop at the first comfortable camping place. Here a mild discussion arose between the two members of our party as to what constituted a good sleeping spot, when we must rest for the night with neither blankets nor down sleeping bags for a covering. Mr. Price declared himself in favor of a bed of leaves, with a great fire on either side, and I advocated the advantages of a sand bank, where the flame could not reach us unknowingly. But nature did not seem to heed my decision, for we traveled on and on, and found no sleeping place such as I desired. Finally an inviting spot under the trees near the river was selected, and tossing off our knapsacks with great satisfaction, we were soon enjoying a supper of corn-meal mush, dried apricots, and beef bouillon. After finishing our meal, I left Mr. Price to gather wood while I repaired to the river to wash our few cooking utensils. It was not long before I saw my husband in great distress, gesticulating wildly, and rushing

toward the stream in strangest fashion, motioning me to leave the spot where I stood spellbound. For a moment I could not think at all; then a confusion of emotions passed through my mind, and finally I thought of snakes. The stories of rattlers and their abundance in the cañon had not been a pleasant prospect from the beginning; and now, on our first night, we had been attacked, and Mr. Price probably bitten. In great anxiety I awaited his approach, and, finally, above the roar of the water, I made out that the cause of all my fears, and Mr. Price's gesticulations, was nothing more dangerous than wasps. Sleep, we knew, in the vicinity of a disturbed wasps' nest, with a fire to keep the insects stirring, was next to impossible; so, quickly gathering our belongings, in the darkness we made our way along the stream in quest of a new sleeping ground. It was no pleasure at that late hour to drag our weary limbs over jagged rocks that often tripped our careless feet, or to slip every now and then, in spite of ourselves, into little pools of cold water; but fortunately, we had not far to travel, and this time it was a sand bank we found. An ideal spot it was, sheltered on three sides by huge bowlders that acted as reflectors for the heat of the fire, and having ready, within reach, wood of all shapes and sizes, tossed there by spring torrents. Sleeping without blankets was a novel experience, but not as uncomfortable as would be expected. With leggings for a pillow, we managed to sleep the greater part of the night, rousing ourselves at long intervals to replenish our fire.

Morning found us somewhat stiff and sleepy, but, withal, refreshed, and ready for another day's experience. During the early hours, our tramp was a pleasant variety of open flats, rough climbing over talus, and hard scrambling through small clumps of trees.

We were now in that portion of the cañon where the walls began to rise higher and grow more perpendicular,

until, in the distance, the double-peaked Tuolumne Castle seemed to pierce the very skies. We found ourselves gazing about us with ever-increasing wonder and awe, while a feeling of our own helplessness and insignificance took possession of us. Just before noon, from the terrific rush and roar of the water, we knew we were approaching the Muir Gorge, where the angry river, after rising and falling for miles, transforms itself into a hissing, seething mass of churning water. Fascinated, we stood on a great bowlder and watched the frothing water hurl madly past into a veritable prison of granite. Out of this chasm rose, side by side, two bare gray walls to the height of a thousand feet, where the northern wall suddenly turned and swept back to the side of the cañon, forming a great rocky spur. Over this rough point we began our scramble about two in the afternoon. On reaching the summit, we found the Sierra Club register can buried under a substantial monument, and to the records added our names, the first since '94. We camped soon after reaching the river again, and slept the sleep that only the tired mountaineer can enjoy.

The third day was our hardest, for the forest fires, which were raging in the adjoining sections of country, made the air close and sultry. Our ambition seemed to vanish, and we advanced only because it was a necessity, and with the perspiration fairly dripping from our faces. Fortunately, however, we had reached Pait Valley, and had delightful walking all morning over small garden-like openings and level flats, through groves of trees and bushes heavily ladened with ripe thimble berries. About half past ten two large deer, startled by our footsteps, went bounding over the floor of the cañon, crashing through bushes and groves of young trees in wildest haste and confusion. For hours we wandered over bears' trails, as well trodden as the ordinary tourist path, and often walked into the feeding grounds of the bear among the manzanitas. For

miles their tracks were visible on the sandy soil, and frequently we were led, in following the trail, to the resting-places of these animals, under the cover of low, sheltering trees.

In the meantime the walls of the cañon, as we had been advancing, had grown less and less perpendicular, farther and farther apart, lower and lower, until, in the distance toward Hetch-Hetchy, though the cliffs were still rugged and picturesque, much of their solemn grandeur disappeared.

In the afternoon, after leaving Pait Valley, we met with rough work once more, and had several hours of difficult scrambling over talus that seemed almost impossible to climb around or over, through brush that pierced our clothing, and over rounded, polished stones by the water-side. The heat was most oppressive, and by five o'clock we were worn out and ready to camp. Just then a sight met our eyes that will long remain in memory. We were on the talus, piled several hundred feet high, and silently struggling along, when, suddenly to our right, and only a few feet away, there fairly shot into the air from out the shelter of huge blocks of granite, two large snakes. They seemed to stand on their very rattles, while, with heads erect, all unmindful of our observations, they twisted their long bodies around about each other, and sported in the most playful manner. The sight was uncanny, yet we stood fascinated for some moments. A second later a shower of missiles made known our presence, and in an instant, rattling loudly as they went, the two reptiles disappeared in the rocks below. A short walk brought us to the river once more, and to a comfortable camping place; but no sooner had our knapsacks reached the ground, than from our very feet came the penetrating, unmistakable rattle again, and two more reptiles were before us. It did not take long to despatch the snakes and secure their rattles, but the place had lost its charm for camping pur-

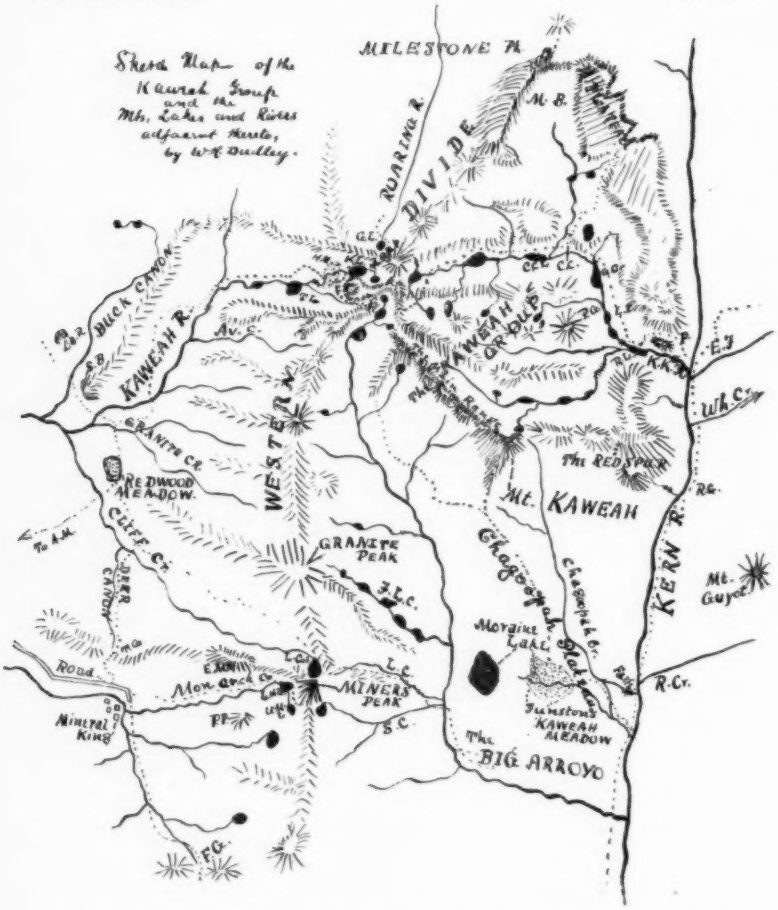
poses, so we slung our knapsacks and started on. More weary than ever, now, we were glad to drop into the first inviting place we came across, and before many minutes had passed, supper was over and we were fast asleep. About twelve o'clock we aroused ourselves to set fire to the great pile of wood which had been collected during the evening, for up to that time the atmosphere, warmed by the burning forests, had made other heat unnecessary. As the first dry twig cheerily crackled in the silence of midnight, from the rocks beyond the fire, and only a few yards away, came once again the same warning note of the rattler. Another snake had been disturbed. But, feeling that all efforts, at that time of night, to escape our unpleasant neighbors were useless, we calmed ourselves as best we could, and in a short time had forgotten our fears in quiet sleep.

We were off on the morning of the fourth day at half-past five, and by seven were delightedly gazing on one of the most beautiful and varied water scenes in the whole cañon. The river, after dashing in small, picturesque whirls for a hundred feet or more, suddenly fell over a perpendicular wall, then dashed on over a silvery apron, smooth and regularly inclined, and then threw itself, with tremendous force, down a great stone stairway in foaming, whirling, tumbling cascades. An hour later, we could see dimly, but unmistakably outlined, far into Hetch-Hetchy, the massive Sugar Loaf; but, before reaching the valley itself, we had to cross one of the roughest spurs that we had met during the whole journey. It was a veritable hauling ourselves up for long distances, then crawling with greatest precision around slippery ledges, only to let ourselves down the rocky cliffs as best we might, jumping, sliding, or slowly edging away; but by ten o'clock we had camped for the day at the entrance to Hetch-Hetchy.

Our journey was over; regret and gladness mingled —

gladness, that an end had come to constant labor; regret, that so much of grandeur and magnificence was far behind us in the cañon. A feeling, almost of indignation, rose within us, when we thought of the glorious cascades, the sheer granite walls, the great Muir Gorge, all pent up within a narrow mountain cleft, inaccessible to the great majority. But anyone who is anything of a mountaineer can see this region, and should journey through the entire length of the cañon, for it is a scenic wonderland, with never a dull step in the whole distance.

[*Editor Sierra Bulletin:*—The Sierra Club is developing some capital mountaineers, and Mrs. Price must be one of the best. The Tuolumne Cañon is perhaps the roughest of all the Sierra streets, and her quiet walk through it was a fine, notable performance. As far as I know, she is the only woman who has traced it through its entire length. The Club should make some sort of a trail through this magnificent cañon. Simply cutting lanes through the densest of the chaparral tangles would go far to render it accessible. Very truly yours, JOHN MUIR.]



Key to the Sketch-Map of the Kaweah Group of Mountains.

Av. C.—Avalanche Cañon.
A. M.—Atwill's Mills, on the Mineral King Road.
C. C.—Cache Camp.
C. C. L.—Cache Camp Lake.
E. F.—"East Fork" of Kern.
E. Mt.—Empire Mountain.
F. G.—Farewell Gap.
F. L. C.—Five-Lakes Cañon.
G. C.—Gallat's Corral and Lake.
G. L.—Glacier Lake.
H. M.—Heather Meadow.
K. K. R.—Kern-Kaweah River.
K. L.—Kaweah Lakes (upper and lower).
L. B. R.—Little Blue Rock.
L. C.—Lost Cañon.
L. R.—The "Lion Rock."
L. Col.—Lake Columbine.
L. M. L.—Lower Monarch Lake.
L. I.—Lake of Islands.
M. B.—Milestone Bowl.
M. Plat.—Milestone Plateau.
P.—Kern-Kaweah Pass.
P. G.—The "Picket Guard" Peak.
P. P.—Plumbago Peak.
R. Cr.—Rock Creek.
R. G.—Redspur Gap.
R. L.—Rockslide Lake.
S. B.—"The Sugar Bowl" Dome.
S. C.—Soda Cañon.
T. L.—Tamarack Lake.
Th. G.—Thunder Gap.
T. G.—Timber Gap.
U. M. L.—Upper Monarch Lake.
Wh. Cr.—Whitney Creek.

POINTERS:

1. The Kern River runs nearly on the meridian line.
2. Whitney Creek points nearly toward Mt. Whitney.
3. Mt. Guyot, as viewed from Moraine Lake, lies midway between Mt. Whitney and Sheep Mountain.
4. The Sketch Map is planned two miles to the inch.
5. The dotted lines mark the principal routes followed in 1896 and 1897.

THE KAWEAH GROUP.

By Professor William R. Dudley.

In July, 1896, I made my way across the Sequoia National Park, by the way of Mt. Silliman and the Marble Fork, to Alta Meadow, explored a passage across Buck Cañon (one of the steepest and roughest cañons in the Southern Sierra), and reached Mineral King by way of Redwood Meadow and Timber Gap. None of the hunters or stockmen we met about Mineral King could give us a clear account of any trail to the Kaweah Mountains. Ascending Miner's Peak (locally known at present as "Sawtooth," from its peculiar beak-like form, and usually estimated at about 13,000 feet elevation) eastwardly from Mineral King, we perceived that the Kaweahs extended much further eastward than the maps represent them — most maps, indeed, following the Hoffmann-Whitney map of 1873, place them directly on the Western Divide. Not only were they apparently largely detached, but between them and the Western Divide (on which Miner's Peak is situated) was a deep groove—the cañon of the Big Arroyo, just as between the Kaweahs and the Whitney Divide was a deeper groove, the Grand Cañon of the Kern.

The Kaweah River has always been represented as taking its rise from some portion of the peaks of that name, and was currently believed to do so by the hunters and campers who frequent the region of Mineral King every summer. I determined to trace this river to its source if possible; and James Rice, of Visalia, who had hunted well

up the Middle Kaweah, was able to give us explicit and valuable directions for the first half of the journey. The trail from Redwood Meadow crossed Granite Creek, followed the right bank of the Kaweah for a mile, then crossed and climbed to Wet Meadow (the Last Chance Meadow of the Sierra Club map), thence passed northeastward, through Bear Paw and Quaking Asp Meadows, to the "Lone Pine," where it descended from the high ground to the open glaciated upper valley of the Kaweah. It is noticeable that traveling is comparatively easy in the upper valleys of the Sierra streams. Trouble comes in at the rocky passes between the upper valleys and in the narrow cañons in the lower altitudes. We camped at the upper meadow of the Kaweah, which was named Heather Meadow, from the large amount of *Bryanthus Breweri*, or "Sierra Heather," growing about. It was by nature a beautiful secluded Alpine meadow, but ruined by sheep. Looking down upon the meadow from the east was a noble peak, whose head and projecting arete cliffs had, in the descending sun, all the repose of the front of a couchant lion. It was named the Lion Rock. The Kaweah comes from the north of this peak, and its source was found in one small and one larger lake, fed by small glaciers from its rear, and from the divide of which the peak is a spur. These were named the Kaweah Lakes.

To the north of these lakes was the beginning of the Kings-Kaweah Divide, and over a high foot-pass in this, but close to the Western Divide, we found the source of the Roaring River in a beautiful circular lake fed by a well-formed glacier. It was after the middle of August, but small icebergs were floating in this and the upper Kaweah Lake, broken from the glacier fronts. From this fact and the presence of old snow and blue ice in these steeply sloping but not extensive snow fields, we speak of them as glaciers. Their motion, which must be slow, was not

observed. We were overtaken here by a storm of hail, accompanied by thunder and lightning, and named the pass to Roaring River, Thunder Gap. From this point the open upper valley of the river stretches straight away northwardly. Ascending, on another day, to the summit of the Western Divide, by way of the cañon south of the Lion Rock, we saw the head lakes of the Big Arroyo lying in a deep cañon at the foot of the cliffs, east and south of us; and off to the southeast of these lakes were the great black Kaweah peaks, connected with the divide apparently (and in 1897 we learned the truth of this supposition), only by a narrow sharp arete, several miles in length. Daily storms prevented further effective exploration that summer.

Early in July, 1897, accompanied by Messrs. Wight and Dudley, students at Stanford, and by Mr. Dean, of Three Rivers, on the Kaweah, who furnished us with our saddle and pack animals, we made our way over the Salt Creek and Hockett trails—partly over my old collecting grounds of 1895—to the southern side of the Kaweahs, by way of the Kern River Cañon. Taking Funston's sheep-trail, the only break for many miles in the great western wall of the cañon, we ascended to Mr. Funston's cabin at the great meadow on the plateau south of the Kaweahs. This is a rolling plateau, several miles square, 9000 to 10,000 feet elevation, and covered with Tamarack pines and meadows. We have mapped it as the Chagoopah Plateau, as it is traversed by the creek forming the Chagoopah Falls. A week was spent in this vicinity exploring the Big Arroyo and Mt. Kaweah, the ascent of the latter being easily made in one day. I quote from Vol. I., page 382, of the Geological Survey of California, by J. D. Whitney: "This last-named (Kaweah Peak) was not reached by our party, but its height was estimated to be over 14,000 feet. From its great elevation and peculiar position opposite the highest point of the Sierra, and the immense depth of the cañon

of the Kern between it and Mt. Whitney, it would probably command the grandest view which could be obtained in the whole range of the Sierra." This view is, in fact, one of the most instructive, if not the grandest. Stimulated by what it revealed, I resolved to try the exploration of the cañons north of the Kaweahs, which we afterward named the Kern-Kaweah River and the Milestone Bowl. This was accomplished, by way of the Kern River Cañon, after another week's hard riding and climbing. The Kern-Kaweah Pass, out of the Kern, is something that will debar the ordinary explorer from this cañon for some time to come, and should not be attempted, except with such excellent mountain animals as Mr. Dean furnished us. We ascended the main branch of the Kern-Kaweah to its source, which lies on the east side of the sharp ridge (about 12,500 feet elevation) connecting the Western Divide with the Kaweahs. One small brook comes from that peak of the Western Divide at whose western and northwestern bases lie Kaweah Lake and Glacier Lake, sources of the Kaweah River and Roaring River. We looked over this connecting ridge and saw, at its western base, the head lakes of the Big Arroyo, the same I had looked at, in August of 1896, from a point opposite, on the Western Divide.

We next ascended to the Milestone Bowl, and from the plateau at its head (over 13,500 feet, and once a part of Milestone Peak) we had the most complete view of the Kaweahs obtainable, and one of the best general views of the Sierra I have seen. Here it was shown even better than from Mt. Kaweah, that the group consisted of three chains (with a remnant of a fourth), spreading southeast and east from the connecting ridge in a fan-shaped manner, as indicated on the map. From their lofty elevation and east and west trend, there is more snow among them in August than among most of the peaks of the Southern Sierra. The black peaks of the main chain are thin, saw-

like, and very precipitous on both faces. From near Fresno I have seen them in midwinter, through a gap in the Western Divide, peering over, black and ragged, from behind the snow-mantled peaks of the ranges about them. Their faces were too steep for snow to lie on them. The gray Kaweah (Mt. Kaweah) the easternmost peak of the main chain, somewhat more tedious of ascent than Mt. Whitney, but perfectly safe, has been reckoned as about 14,140 feet elevation. From Mt. Kaweah, this chain continues east to near the Kern, in a long, reddish, sloping ridge, seen from many places in the Kern River Cañon. We named it the Red Spur. Where it terminates near the Kern is the grandest scenery of the cañon. There is a fine pyramidal peak at the eastern end of the third range, which was always in the background of the view as we entered and ascended the narrow cleft of the Kern-Kaweah. This was named the Picket Guard.

Finally, descending from the upper Kern-Kaweah to the Kern by the pass through which we had left it, we ascended the middle fork for a mile or two, climbed out of the cañon eastward, and, by the end of the second day from the Kern, we had reached Mt. Whitney, ascended to its summit, and returned to our camp at its base. It was about one full day's journey from the junction of the Kerns to the Upper Crabtree Meadow.

Before our return to the valley, we were enabled to see most of the larger tributaries of the Kern; and apparently the Big Arroyo and the Kern-Kaweah separately pour more water into the main stream in midsummer than any of the branches from the east; and the Kern-Kaweah is larger at its junction with the Kern than the Kern itself.

The above is the merest outline of the two efforts at the exploitation of this region, and gives nothing of the splendor of its great peaks, the beauty of its waterfalls, the grand processional of scene in the upper Kern River

Cañon, or the devastation occasioned by sheep-feeding on all the ranges except that of the beautiful Chagoopah Plateau (Funston's) where a more rational practice prevails. On the other ranges the great obstacle to the explorer is not danger from crag or chasm, but the starvation threatening his animals, through the destruction of the fine natural meadow pasturage by sheep.

The accompanying map is expected to give the true relationship of only the principal points about the Kaweah Mountains. It does not include a considerable amount of detail accumulated in notes and sketches, also in photographs which Mr. Wight took largely for my satisfaction.

It has been constructed, however, with considerable care in regard to proportion, the position of lakes, streams, and mountains, and their relation to certain well-known points, such as Mt. Whitney, the Milestone, and Miner's Peak. The dotted lines represent our journeys, and usually correspond to trails (mostly of sheep men), sometimes to routes of our own choosing.

Those who consult the map are asked to observe that it presents the following geographic facts practically new to science:—

1. It shows the almost complete isolation of the Kaweahs from the Western Divide, and their division into three or four chains.

2. These peaks are wholly drained by branches of the Kern River, principally by the Big Arroyo and the Kern-Kaweah, which have never before been mapped recognizably, neither have any explorations of them been published.

3. The Kaweah River drains no part of the Kaweah Mountains.

4. The lakes at the river-sources and elsewhere are new to the maps. A considerable number among the Kaweahs and along the Western Divide are not indicated,

but with the number given suggest the elevated and highly glaciated character of the region.

5. The peaks giving rise to the Kaweah and Roaring Rivers and the two chief branches of the Upper Kern represent one of the principal geographical centers of the Southern Sierra.

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

The Mazamas' Trip to Mt. Rainier.

The Mazamas, the mountaineering society of the Pacific Northwest, with headquarters at Portland, pursue the custom of making a concerted expedition to some mountain region in their field during each summer, and invite to join them all others who will go, to climb some snow peak, explore its surroundings, and enjoy its attractions. Their expedition of 1897 was to Mt. Rainier,* Washington, and was the most ambitious they have yet attempted. It brought together, late in July, in Paradise Park, on the south side of Rainier, about two hundred mountain lovers. Of these, about seventy-five were bold enough to wish to climb the mountain, while the rest found abundant fields for enjoyment on the glaciers and among the lesser though difficult peaks of the neighboring Tatoosh Range. To conduct so large a company at once to the summit of a mountain so high, so difficult to climb, and offering so many dangers to the climbers, was more of a problem in mountaineering than the Mazamas had as yet had to face. It was most successfully solved. All those who proposed to climb were formed into a battalion of five companies, under strict military discipline, and all signed a formal pledge to obey orders strictly. On the climb the companies marched in one long line, single file, all starting and halting according to command. Thus the whole company was kept closed up, and laggards were not left behind. The first day's climb was an easy one, to "Camp Muir," at an elevation of about 10,000 feet, about four miles above the snow-line. Camp was made on an exposed ridge of bare rocks. Several decided not to go beyond this point, where the real difficulties and dangers of the ascent begin.

The ascent from Camp Muir to the summit and return was accomplished the next day, July 27th, between five in the morning

*See discussion of the name of this mountain in No. 4, Vol. I, *Sierra Club Bulletin*, by O. B. Van Trump.

and nine in the evening. There were sixty on the whole expedition who reached the summit, two small parties climbing in advance of the main company. The last 2000 feet of the climb were rendered unusually dangerous by the condition of the snow, which was hard and crusted, as well as very steep. But, with constant vigilance and continued use of the life line, all accidents were escaped. The party reached the summit about 4 P.M., and were able to stay in the crater less than an hour before it was necessary to return, leaving eight of their number to spend the night on the summit and burn red fire in the evening, and to attempt heliographing and kite-flying the following day. The atmosphere was remarkably clear, and the signal lights were seen and answered from Tacoma and several other distant points. The attempts at kite-flying and heliographing, owing to insufficient preparations, were unsuccessful.

One fatality marked the expedition. At about eleven o'clock on the night of the descent, Prof. Edgar McClure, of the University of Oregon, while within an hour of the main camp at snow-line, lost his footing on a steep slope of snow, and was dashed upon a pile of rocks at the bottom as he slid. Death was probably instantaneous. On the next night two others slipped very near the same place, and fell into a small crevasse, but were rescued after some three hours.

Excepting these accidents, which occurred after the dangers of the ascent were all supposed to have been passed, and after the vigilance previously exercised had been relaxed, the ascent was a remarkable record of successful mountaineering. That sixty persons should have gone in one party to the summit of so high and difficult and dangerous a mountain as Rainier, and all have returned practically to the foot of it without even a scratch or a sprain, is very noteworthy; and the highest praise is due to the Captain of the expedition, Mr. Edward S. Curtis, of Seattle, and to the strict discipline which he maintained.

Without the maintenance of military order in climbing, either a much smaller number would have succeeded in reaching the summit, or else there must almost certainly have been serious accidents at some of the places of danger. It is doubtful, however, whether it will be thought desirable again to attempt to make an ascent with so large a company; and it may be that this ascent of the Mazamas will stand for a long time to come as the best record of concerted climbing yet established.

EARL MORSE WILBUR.

A Direct Route from Susanville to Fall River Mills.

A study of the map of California will reveal two possible direct routes from Reno to Mt. Shasta. These two routes, passing the one through Quincey, the other through Susanville, converge beyond these towns until they meet at Fall River Mills, from which a road leads directly to Mt. Shasta and Sisson.

When planning our trip last summer, we wished to try the route via Quincey, but were warned that there existed no road to the north beyond Prattville in the Big Meadows, unless we went into the Sacramento Valley. We were also informed that the only road from Susanville lead by a circuitous route through the desert, via Eagle Lake and Bieber, a distance of 100 miles. Both of these statements we afterwards found to be incorrect.

At Susanville we were told of a direct route via Pine Creek, which had been traversed by a few, who were enthusiastic over its advantages. But they were unable to give an accurate description.

I was persuaded to take it and to abandon it half a dozen times within as many hours; but, of course, the last man to offer his advice won the day and sent us forth with fair directions for the first half of the journey, but with only these words ringing in our ears to direct us over the remainder of it: "If you lose the road, after leaving Pine Creek, bear to the northwest until you reach Fall River Valley." Before night we found the headquarters of Galen C. McCoy, who had a thorough knowledge of all the northern Sierra uplands, resulting from an acquaintance of twenty years with them. Under his direction I drew a chart of the remainder of the road, which we followed without further trouble.

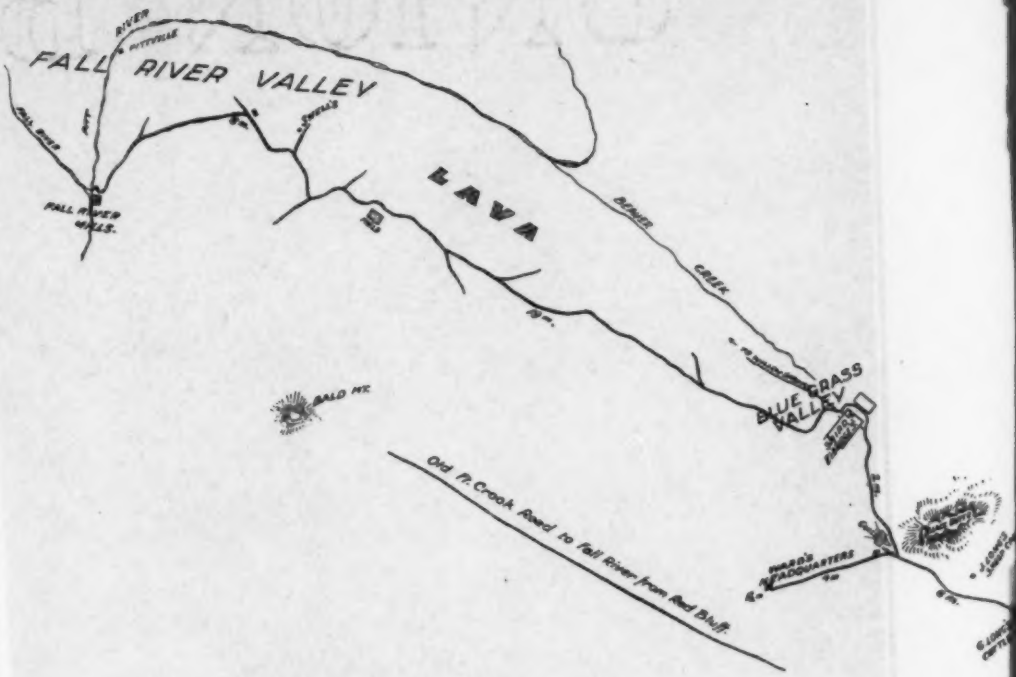
This road, via Pine Creek, is superior to the old road via Bieber in almost every respect. First, in having a length of seventy miles, while the latter is thirty miles longer. Second, in lying in the midst of timber and meadows, instead of desert. Third, in having but one long grade down the gradual descent into Fall River Valley, and, fourth, in having two stations now available, which divide the road into sections varying from eighteen to twenty-eight miles.

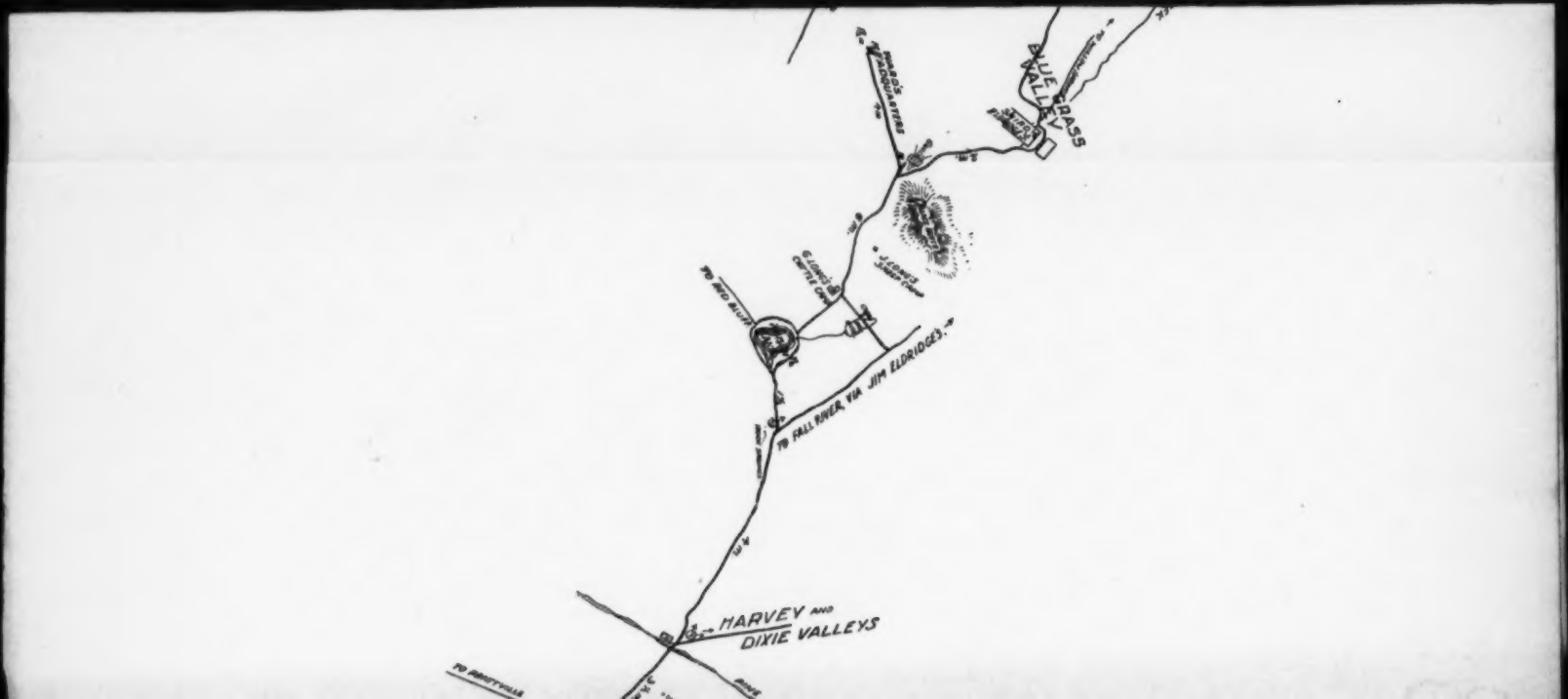
The road via Bieber may have one advantage, that of being kept open during the winter more easily than the other. But of this I cannot speak positively.

For these reasons, I offer the following map as a means of opening a road, which, in time, I believe, must become the direct line of communication between Susanville and Fall River Valley.

The character ♂ indicates blazes on the road.

1. ♂—"To Prattville, Bridge Creek, and Pine Creek."
2. ‹○—"To Prattville."


FALL RIVER VALLEY
FALL RIVER MILLS.
LAVA
BALD MT.
BEAVER CREEK
BLUE GRASS VALLEY
Old Mt. Crook Road to Fall River from Red Bluff.


BLUE GRASS VALLEY
TO RED BLUFF
TO FALL RIVER VIA JIM ELDRIDGE'S
HARVEY AND DIXIE VALLEYS

HARVEY AND
DIXIE VALLEYS
TO PRATTVILLE
HOG
FLAT
TO PRATTVILLE
TO PRATTVILLE
TO SUSANVILLE
SUSANVILLE
MONEY LAKE VALLEY
N



3. ♂—"To Pine Creek." This signboard is in a tree, just where the road turns down a hill, and might easily be overlooked. The right-hand, though fainter road, must be taken.

4. ⟲—"To Hog Flat Dam and Pursers."

The Reservoir is a large shallow pond, formed by a dam built across the lower part of Hog Flat, for the purpose of storing water for irrigation in Honey Lake Valley.

5. ♀—"To Susanville." At the foot of a short grade leading down into the northern portion of Hog Flat. The main road leads to the right and out of the flat. The left-hand road runs directly up the flat to McCoy's headquarters, the fence of which can barely be distinguished in the distance.

A dim cut-off of two miles leads back to main road.

Bridge Creek is a misnomer. The stream at its mouth is not more than four and a half feet wide.

Feather Lakes are each perhaps one-half mile long, lined with reeds. Through low saddle to northwest, Mt. Shasta can be seen low down on the horizon, covered with snow. One-half mile further on, a road from Prattville to Grasshopper crosses main road. This is the road north from Prattville, whose existence had previously been denied.

6. ♀—"To Susanville."

Pine Creek flows through northern part of large barren pine, about six miles long and three miles wide, sloping from Feather Lakes to low saddle in the north. Part near Feather Lakes thinly dotted with pines. A small cabin, looking at first in the distance like a horse grazing, is in the center of the barren, near the meadow. On further side of Pine Creek is a small enclosure with cabin. This was formerly Cone's headquarters, now abandoned, the headquarters having been moved about four miles to Harvey Valley. Road passes to east of cabin about 150 yards and crosses road from enclosure to Harvey and Dixie Valleys, a signboard indicating the left-hand road to Fall River.

7. ♂♂—"To Fall River," "Harvey and Dixie Valleys." The road to Pittville and Fall River formerly passed through Dixie Valley, a hay and stock valley, about six miles long and two wide, exclusive of bench land, but, on account of its roughness, has lately been abandoned.

Rock Springs is a bench of timber, south of road, bordered by a reef of rocks fifteen feet high, fringed with aspens. To find spring, go 150 yards west from signboard to big lone pine tree, fifty yards west of clump of four pine trees, and then back toward reef.

8. ♂—"To Fall River," "To Susanville."

The right-hand road, marked "To Fall River," passes by Jim

Eldridge's, ten miles from Pittville. Take left-hand road, via Poison Lake, since it is shorter, has an easier grade, and has a station nearer at hand. At signboard the road is almost obliterated, but can be seen a short distance to the west.

Poison Lake.—The road to the north of Poison Lake is at times hard to find, on account of the high water, but there are numerous wagon tracks. Go to northwest corner of lake, where a road marked by cattle tracks leads over ridge and directly north two miles to *George Long's Cattle Camp.* This consists of a pond of water enclosed by fence near ledge of rock. North are two other enclosures, one of which contains an empty cabin. To the east, at a distance, is cabin in depression known as Dry Lake.

Black Bulte is a low, forest-clad peak, with gradually sloping sides, and somewhat more prominent than other hills around it. It is situated about six miles north of Poison Lake. The road from George Long's Cattle Camp to Jelley Camp and Shird Eldridge's passes through depression to the west of it, while the road from Rock Springs to Jim Eldridge's passes east of it. Black Butte is at the summit of the Sierra range. *Joe Long's Sheep Camp* is to the right of the road, but hidden by trees.

Jelley Camp is an abandoned cabin on the west side of a gulch which runs north and terminates in a cañon leading toward Pitt River. In the gulch are enclosed springs. The road is barely traceable at this point. Two routes are now available to Fall River, one leads directly past the cabin, west four miles to Ward's headquarters. Here pass west through gate, down hill one and one-half miles, to old Fort Crook road, which passes Bald Mountain. This is the shortest route, but the most desolate. To take the second route, cross to east side of gulch, south of cabin, and take road to the north on the ridge above the gulch. This road leads to the dairy ranch of Shird Eldridge, where good accommodations will be found. After leaving Eldridge's, take road north, winding to west around his meadow fence, until the old road from Jelley Camp, through meadow to Willow Springs, is reached. Follow this road a few rods until a new road turns from it to the west and leads up ridge to the west. This road is a cut-off from the old road, and will soon take its place. We followed it by means of Eldridge's wagon tracks. After a gradual descent of eighteen miles, through pines, junipers, and lava, Snell's white house and windmill will appear to the right. From this point take every left-hand road for six miles, over the upland within sight of the ranches, until the road winds from north of west to south, and leads along an arm of the valley to Fall River Mills.

J. E. CHURCH, JR.

November 26, 1897.

A Route up the Merced River.

Of the many trips which may be taken from Yosemite Valley as a starting point, into the grand and picturesque scenery of the National Park, one of the finest is a route up the Merced River Cañon, explored last July by our party, with two pack animals, a horse and a mule. Owing to the uncertainty of finding a way up this cañon with pack animals, and fearing, in case of failure, to mislead others, we did not attempt to blaze or monument a route, except in some few places, and having made but brief memoranda at the time, only very general notes of the course can now be given.

Leaving Yosemite Valley late in July, we followed the trail leading to the Tuolumne Meadows by the way of Clouds Rest and Cathedral Peak, to a point about two and one half miles beyond its junction with the Clouds Rest trail, and about one half mile beyond Hopkins Meadow. Here we left the trail and worked down into the cañon of the Merced River, just above Little Yosemite. Our route then lay for some distance over a surface exhibiting the most remarkable evidence of glaciers to be found in this whole region—rounded, billowy masses of granite, beautifully polished and perfectly striated, as though the work had been done but yesterday. The best route here appeared to be about midway between the river and the wall to the left, avoiding the fissured surface of the granite near the former, and the talus of the latter. Proceeding a short distance, it was found advisable to approach nearer the north wall and cross a low spur, beyond which Echo Creek joins the Merced. Coming down to the river, traveling was found comparatively easy through meadows and groves and along cascades, till an inclined, glaciated surface, extending from high on the cañon wall to the river, was reached. To cross the river at this point was not practicable. With sure-footed, unshod mules or burros, it would be possible to cross safely the granite surface, but one of our animals being shod, for us to have attempted it would certainly have been unwise. A way along the river was found, where, with the exception of about thirty feet, there was no difficulty in proceeding. This thirty feet consisted of a granite slope, inclined at an angle of about forty-five degrees, and extending into the river. Across this surface we placed long, slender tamarack logs, firmly supported at their ends. Upon them we lay brush, rocks, and pine needles, and thus constructed a sort of bridge. The results of our work will probably be washed away by the next high rise of the river, but the bridge can be reconstructed with two or three hours' work. Just beyond this point is Lake Merced, a perfect gem in a setting of granite. The next three or four miles presented no difficulties, till some steeply-inclined, boggy

ground, thickly covered with aspens, was reached. Here it was necessary to exercise some care in preventing our animals from miring, and from falling over huge moss and brush-covered bowlders. After passing this place, we came to another granite obstruction, similar to that below Lake Merced, and just beyond which lay Lake Washburn. Our progress on the north side of the river was here absolutely barred, but we proceeded as far as we could, then crossed to the opposite bank, and, advancing a short distance on this side, we recrossed at a point fifty or seventy-five yards below the outlet of the lake. This recrossing was necessary, for on the south shore of the lake the talus extends into the water, and renders progress with animals difficult, if not impossible.

Lake Washburn is similar in size and coloring to Lake Merced, but, unlike the latter, which is centered in a park-like opening, this lake approached so near the high overhanging walls, that they reproduce themselves in the silvery water below with a clearness and beauty seldom surpassed in the Sierra.

About one mile beyond this lake, the cañon terminates in a high scarp, or cirque, with perpendicular walls, fifteen hundred or more feet in height, down which, at a distance of about one third of a mile apart, three large streams plunge in magnificent cascades. The first is the Lyell Fork of the Merced; the second, a little further to the south, the main Merced, and the third, still further to the south, the Merced Peak Fork. No possible way of advancing appeared, except up alongside one of these cascades, and a glance showed how futile would be an attempt to climb up the Lyell Fork. On the south side of the main Merced, the ascent would have been comparatively easy, had it not been for a low, but vertical, wall about half way up, which effectually prevented further progress with animals. So we attempted the north side, and with some difficulty found a way up two thirds of the distance, but here advance was barred by a sheer wall. Our only recourse was to cross the cascade and proceed the remainder of the distance on the south side, and it was with some hesitation and misgivings that we attempted the crossing at the only possible place, and where the angle of descent was less than at other portions of the cascade. This crossing, while not particularly difficult at low water, would be attended with great risk at other times, for, if the footing of pedestrian or pack animal should once here be lost, the result would be a fatal plunge for hundreds of feet to the cañon below. For this reason, it is desirable that a way be found up the Merced Peak Fork, and it is likely that this is possible, and the Merced River reached by crossing the low intervening divide.

After crossing the stream, we reached the head of the cascade by working carefully over the glaciated granite of the south side,

and up an improvised stairway, over loose granite blocks, to some large meadows above, which we named the Merced Meadows. These meadows, while not so extensive as the Tuolumne Meadows, are very similar, and particularly resemble that portion of the latter above the Dana Fork. Continuing up the main stream as it bends to the south, nearly to the foot of a fine, rugged peak at its headwaters, we crossed the divide into the basin of the Merced Peak Fork, from which an easy ascent of Merced Peak was made. Returning to the Merced Meadows, and crossing to the east of them, we reached McClure's trail, which, though well blazed and monumented, offers little, if any, evidence of travel. A full description of this trail may be found on page 333 of No. 8, Volume I., of the SIERRA CLUB BULLETIN, under the title of "Jackass Meadows to Tuolumne Meadows."

To the east of the Merced Meadows, at the foot of the Merced-San Joaquin divide, is a series of table-lands and lake basins, where nestle some of the most picturesque glacier lakes. A traveler in this region should not fail to leave the trail for an excursion to these lakes, and for a climb to the Merced-San Joaquin divide, from which, overlooking the basins of the branches of the North Fork of the San Joaquin, a view of Mt. Ritter and the Mniarets may be had, surpassing in grandeur anything else in the whole Sierra.

Returning to McClure's trail, it is easily followed to the Lyell Fork, which it crosses just above the point where the river makes its plunge in splendid cascades into the Merced cañon. At this point we left the trail, and ascended the stream about a mile to an ideal camping spot at a beautiful meadow, thickly bordered by large tamarack pines, which we made the headquarters for trips to Mt. Florence, Mt. Lyell, and Mt. Kellogg. The first two may be ascended without difficulty from this direction, but the last-named presents some difficulties in ascending the last two or three hundred feet, and may be much more easily climbed from the Rush Creek basin. McClure's trail guided us the remainder of the distance to the Tuolumne Meadows. At the McClure Fork of the Merced, we took the "shorter but more difficult way" indicated in Lieutenant McClure's notes on page 334 of the BULLETIN. The difficult portion of this route is covered in a mile or more from its junction with the plainer trail which leads west, and the remainder of the distance is delightful.

The whole upper Merced region is a constant succession of charming surprises, splendid forests, beautiful velvety meadows, glorious cascades and crystal, glacier lakes. To me it is the finest region of the Sierra. ROBERT M. PRICE.

During the past summer Sierra Club cylinders were placed upon the following mountains:—

FREEL PEAK, September 10th, by Mr. Dorville Libby.

MERCED PEAK, July 29th, by a party composed of Mr. and Mrs. R. M. Price, Mr. F. W. Reede, and Mr. Theodore S. Solomons.

MT. FLORENCE, August 4th, by Mr. Reede and Mr. Solomons.

MT. HOFFMAN, by Mr. Solomons and Mr. Turner.

CATHEDRAL PEAK, by Mr. Solomons and Mr. Charles A. Bailey.

MT. RITTER, July 10th, by Miss Helen Gompertz and Mr. J. N. Le Conte.

UNIVERSITY PEAK, July 21st, by a party composed of Mr. and Mrs. Charles J. Durbrow, Miss Catharine E. Wilson, Miss Caroline Rixford, Dr. Emmet Rixford, Mr. W. W. Sanderson, and Mr. Harry W. Knoll. The gentlemen of the latter party also ascended Mt. Brewer and Mt. Stanford, placing a cylinder upon the latter peak and leaving their names in the cylinder already upon the former.

BOOK REVIEW.

In the last number of the BULLETIN, we made mention of *Edward Whymper's* "Guide to Chamonix and the Range of Mont Blanc." The Sierra Club has since received, from the same distinguished author, a companion book, "A Guide to Zermatt and the Matterhorn." Everything that was said in the last number concerning the Guide to Chamonix, may be repeated with emphasis with reference to the Guide to Zermatt. It may be that to some persons the work would not possess all the interest of the most exciting novel, but certainly all good Sierra Club members will find it a book to be read with absorbing interest. It is thoroughly illustrated with maps and engravings, contains all the desired information necessary to the tourist, and is crowded with interesting history and narrative relating to the exploration of this region, which the author designates as the "Cream of the Alps."—(John Murray, publisher.) J. M. S.

FORESTRY NOTES.

Edited by Professor WILLIAM R. DUDLEY.

Such a thing as a public forestry policy appears to exist in America, although it is somewhat shadowy when compared with the systems in vogue in the countries of Central Europe. Looking over an important document issued by the United States Land Office, in January, 1897, entitled: "Compilation of Public Timber Laws," one observes that the forestry "policy" presents itself under three phases. The fundamental Act is that of March 2, 1831 (Section 2461, United States Revised Statutes), which prohibits the cutting of timber from any of the public lands for any purpose whatever, except for use of the Navy of the United States, and imposes a punishment for violations of the law. The next is a modification of the above, and authorizes the cutting of timber, first by right-of-way railroads, then by miners, agriculturists, and others, for use in construction or on claims, and this legislation is chiefly embodied in the Congressional Acts of March 3, 1875, June 3, 1878, and August 4, 1892. Lastly, and this is practically the initial step of a new policy, the Act of March 3, 1891, authorizing the President of the United States to make forest reservations. All other Acts and decisions relating to the public forests are extensions of these three principles.

During the year ending with June, 1897, there has been a remarkable exploiting of forestry ideas and agitation of forestry questions, as is witnessed by the following events:—

June 11, 1896: Congress appropriated $25,000, "to enable the Secretary of the Interior to meet the expenses of an investigation and report by the National Academy of Sciences on the inauguration of a national forestry policy for the forested lands of the United States."

July 2, 1896: The United States Forestry Commission, appointed under the above Act by Wolcott Gibbs, President of the National Academy, began its investigations. It consisted of seven members, including the President of the Academy as an *ex officio* member. The others were: Charles S. Sargent,

author of the volume on Forestry in the Tenth United States Census and Director of the Arnold Arboretum; General Henry L. Abbott, of the United States Engineer Corps; Prof. William H. Brewer, of Yale University; Alexander Agassiz, a large owner of mines; Arnold Hague, United States Geological Survey; Gifford Pinchot, practical forester.

February 1, 1897: The Commission made its preliminary report, recommending the creation of thirteen forest reservations, with a total area of 21,379,840 acres, and situated in the States of South Dakota, Wyoming, Montana, Idaho, Washington, Utah, and California.

Washington's Birthday, 1897: The President of the United States set aside, under the Act of Congress of March 3, 1891, the above thirteen tracts as Forest Reservations. The above recommendation of the Commission, and the action of the President in reserving this large amount of forest land from sale or entry, took the enemies of an honest and economical utilization of the national forests by surprise. The sparsely-settled Rocky Mountain and Cascade Mountain States are largely controlled or "owned" by the lumber and mining companies; and the Senators from these States moved concertedly and with great alacrity against the forest reservations. In less than a week after the President's proclamation, they had secured, without opposition, the passage of an amendment to the Sundry Civil Bill, completely restoring to the public domain all the reservations created on February 22d, except those in California, which were allowed to stand at the suggestion, it is understood, of the Senators from that State. The House failed to agree to this amendment, however, and, as the entire Sundry Civil Bill remained inoperative from lacking the President's signature, the Cleveland reservations came out of the session unscathed. In the extra session which followed the inauguration of President McKinley, the discussion was renewed, prolonged to the end of the session, and was remarkable for the acrimony shown by the Northwestern Congressmen. The opinion of Congress for 1897, on our forestry policy, was finally expressed in the Sundry Civil Expense Bill, passed June 4th. This Act restored to the public domain, until March 1, 1898, all the forest reservations of February 22d, excepting those of California, and appropriated $150,000 for a survey of all the forest reserves made under the Act of March 3, 1891, besides decreeing certain regulations.

In the meantime, an Act passed Congress, February 24th, providing for the trial and punishment of those who willfully or carelessly set fires in forests.

On May 1st was printed the final report of the United States

Forestry Commission appointed by the National Academy — an important paper, elaborating a national system of forest administration and recommending the creation of two additional national forest parks, to include the Grand Cañon of the Colorado and Mt. Rainier, besides reporting on the existing conditions of the forests of the public domain, and giving the text of proposed legislation bills providing for the above-mentioned forest administration.

On June 30th the United States Commissioner of Lands, Hermann, issued a circular of "Rules and Regulations Governing Forest Reserves."

In addition to the above, a very large number of articles in popular and technical journals have appeared, discussing questions of forestry raised by the President's proclamation of February 22d, and the long debate ensuing. The year has been chiefly memorable, indeed, for active discussion, so far as forestry is concerned, and the probable enlightenment of a larger number who have given this subject but little thought heretofore. In view of the temporary annulment by Congress of President Cleveland's orders establishing the thirteen new forest reservations, and the great danger to which the reservation policy is exposed, the practical gain would appear to be small. But such a subject as economic forestry has everything to gain by a full public discussion, and everything to lose by a restriction of discussion to political circles.

The suspension of the President's orders of February 22d for one year only, from March 1, 1897, makes it probable that the subject will come up again during the coming session, or at least during the life of the present Congress. The vote of the two houses, therefore, in the late extra session, becomes a matter of interest. The test vote, in the debate in the Senate, on the amendment abrogating the orders of President Cleveland, stood 32 to 14 in favor of abrogation. Five days after, on May 11th, and after considerable debate, the House refused to concur with the Senate amendment, by a vote of 100 to 39. It has before been noticed of late years, that the branch of Congress which should show the greatest statesmanship is less conservative of the rights of the whole people, and more the champion of special interests, than the more popular branch.

California is to be congratulated that all the withdrawals of public land from sale or entry (reservations) thus far made still remain uncanceled. The large Sierra Reservation (including

the Stanislaus) extends northward along the Sierra about 220 miles, from near the latitude of Bakersfield to within four or five townships of Lake Tahoe. Reservation of all the government land along the Sierra to the northern boundary of the State, until experts could decide what should be finally withheld for the public good, and what should be thrown again on the market, would be a wise act on the part of President McKinley, and probably would meet with very little opposition from the people of California. A considerable portion of this region has already been mapped by the United States Geological Survey.